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Kenneth H. Condit
Fred H. Colvin

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Characteristics of Brass-Forging Dies

By Frank W. Curtis
Western Editor, American Machinist

AMONG the outstanding advantages a brass forging has over a casting are greater accuracy, additional strength and better machining qualities. To gain these benefits, however, much depends upon the design and construction of the forging dies, and the method in which they are used. A brass forging is made similar to a steel forging, in that the heated metal is formed between dies, yet there are many precautions to be observed in forging brass that will determine largely the quality of the product.

At the plant of the Mueller Brass Company, Port Huron, Mich., brass-forging dies are made according to a standard practice that has been developed from past experience. Two types of dies are used, one is suited for work to be made in the power press and the other is for parts lending themselves to the drop-hammer method. Forgings of a shallow nature having a wide draft, such as cylindrically-shaped pieces, are usually made in the drop hammer, whereas parts having a deep draw, with specifications calling for very little or practically no draft, are made in the press. Forgings made in the press are usually completed singly in one stroke, while those made in the hammer generally necessitate a roughing and a finishing operation and are made in multiples, that is, from two to five pieces at a time. Another difference is that pressed parts are made from slugs cut off to correspond with the shape of the finished unit, and hammered forgings are made from the end of a bar as in steel-forging practice.

Dies of the power-press type, including the upper and lower sections, are made of high-speed steel, round in shape, which are shrunk into carbon-steel rings. The fit between these units is made ½ in. taper per foot. Both rings are mounted on cushions, one of which is attached to the press ram and the other to a baseplate on the bolster of the press. A sectional view of this construction is illustrated in Fig. 1. The contacting faces of the upper and the lower dies are beveled a short distance from the impressions, so that the flash will have sufficient clearance to form. To the upper ring *A* is attached the liner *B* that fits over the lower ring *C* as the dies are being closed. This construction not only adds rigidity to the dies but insures alignment as do the guide pins of pillar presses. The liner is made in sectional form and is fitted to the die ring by a tongue. A section of the ring and the liner, approximately 4 in. in width, is cut out at the front to facilitate the insertion and the removal of the work. When the shape of the work permits, the dies are made with knock-out plugs that form the upper and the lower faces of the forging. The plugs slide vertically in rela-

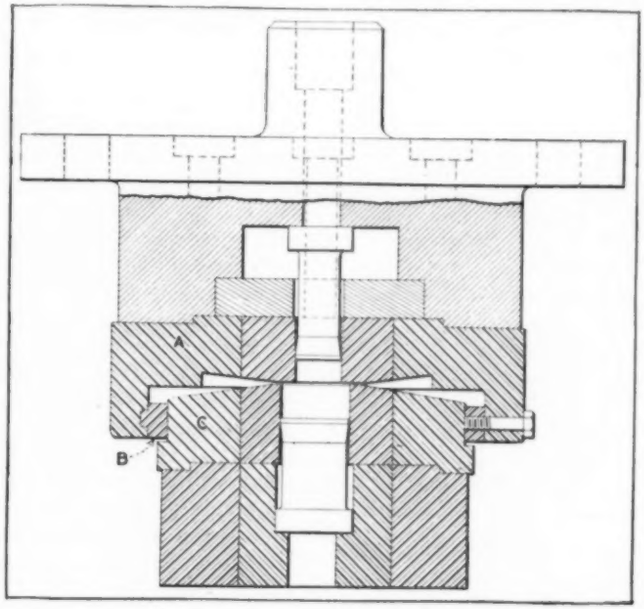


Fig. 1—Constructional details of a power-press brass-forging die, showing the upper and the lower die sections, the ring into which they are shrunk, and the cushions

tion to the press stroke, so that the finished part is ejected from that die impression in which it is most likely to stick.

Dies for parts that cannot be removed in this way are constructed with ejector pins that strike the flash of the finished forging. The vertical movement of the pins, in relation to the press stroke, is actuated by a plate inserted in the die cushions, in place of the plugs. Occasionally parts are encountered for which the dies can be made with a combination of the knock-out plug and the ejector pins.

Two sets of dies that use knock-out plugs, together with the parts they produce, are shown in Fig. 2. The example at the left represents a deep-drawn section made from a slug, $1\frac{5}{8}$ in. in diameter by $1\frac{7}{8}$ in. in length. The hole is forged by a knock-out plug attached to the upper die assembly. The other example illustrates a set of dies used to form a coupling that resembles a ring. The slug used in making this part is $2\frac{3}{8}$ in. in diameter by $\frac{3}{4}$ in. in length.

A set of dies, constructed with a knock-out plug in the lower half and three ejecting pins in the upper half,

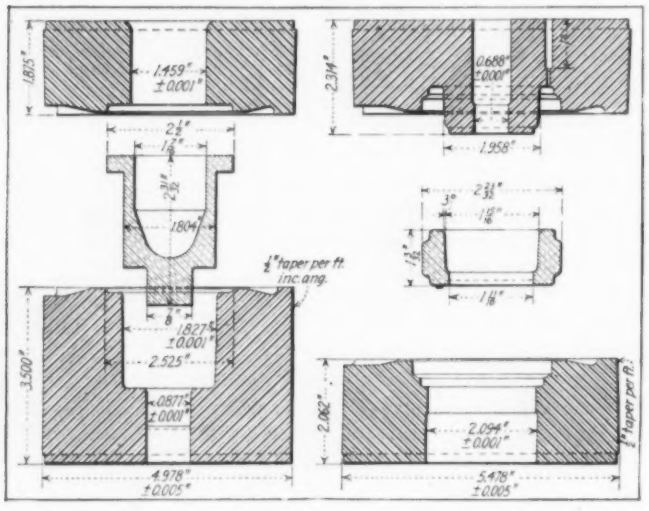


Fig. 2—Two sets of press-type forging dies, equipped with knockout plugs that operate in connection with the ram travel, so that the work is ejected automatically. The knockout plugs form a portion of the upper and lower faces of the forging

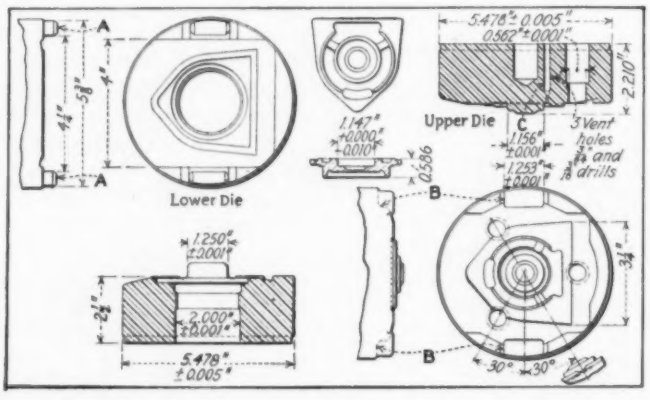


Fig. 3—Occasionally dies cannot be made with knockout plugs, in which case ejecting pins, striking the flash of the forging, are used as shown in this example which has a plug in the lower die and pins in the upper die. The operation of the ejector pins is actuated by a plate located in the die cushion

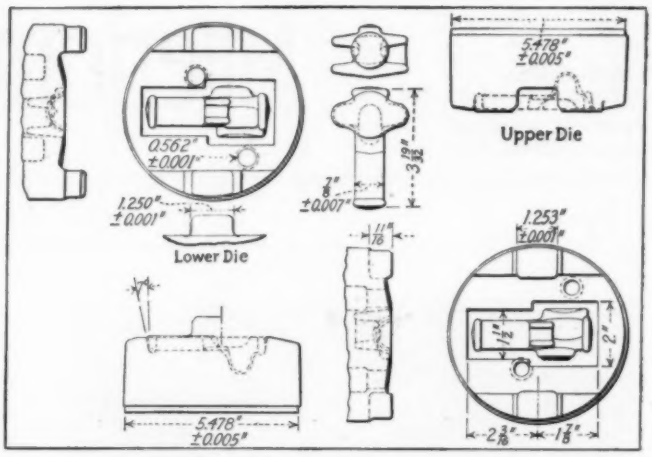


Fig. 4—A die made with ejector pins in both sections. When the die impressions are closed, it is necessary to provide air-vent holes to enable the metal to flow readily. These holes are made 3/64 in. in diameter adjacent to the impression and enlarged somewhat in the body section

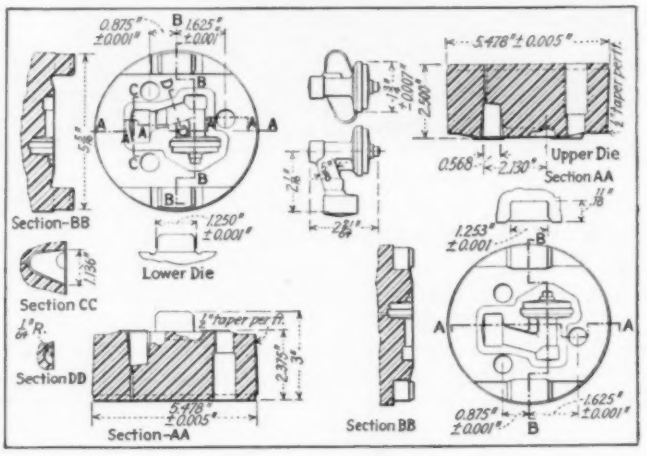


Fig. 5—A set of dies for forging an intricately-shaped part. The die construction is similar in detail to the dies previously illustrated. The operator has no difficulty in placing the slug rapidly in the correct relative location to the die impression

is shown in Fig. 3. The outline of the part is somewhat irregular and illustrates one of the individual shapes that can be forged from brass. The slug from which it is made is $1\frac{3}{4}$ in. in diameter by $\frac{5}{8}$ in. in thickness. The lower die is made with two tongues *A* that engage the slots *B* of the upper die when the press is put in motion, thus aligning the dies before the slug is actually pressed, and preventing either die section from slipping out of place. For concentrically-shaped parts the tongues are not required, but in making forgings having a shape like that shown, the misalignment of the dies would cause inaccurate results, and in addition might cause breakage of the dies. Whenever the impression in the die is closed, as is the case in the upper die shown, it is necessary to provide air vents so that the metal will flow readily into the impression. These vents are made $\frac{3}{64}$ in. in diameter adjacent to the face of the impression and are $\frac{3}{16}$ in. in size through the body of the die. At *C* is shown the cross-section of one of these vents.

The dies illustrated in Fig. 4 are made with two ejector pins in each die section, inasmuch as the shape of the part does not lend itself to dies having knock-

out plugs. Tongues are used to aid alignment as in the preceding example. A slug measuring $1\frac{5}{8}$ in. in diameter by $2\frac{1}{2}$ in. in length is laid horizontally on the lower die, whereas in the other examples the slugs are inserted in an upright position. Another intricately-shaped set of dies is illustrated in Fig. 5, which follows in general the same construction outlined. The slug, however, is rectangular in shape, measuring $1 \times 1\frac{1}{2}$ in., and 2 in. in height. In some cases, the outline of the part is such that slugs cut from specially-shaped extruded bars are used.

A complete set of forging dies set up in a press is illustrated in Fig. 6. The part shown at *A* is a float-valve header which is made from the slug *B*. The view shows a baseplate in place, also the cut-away section in the upper ring to provide clearance for unloading.

Dies of the drop-hammer type are made of heat-treated die steel having a Brinell hardness of 52-57.

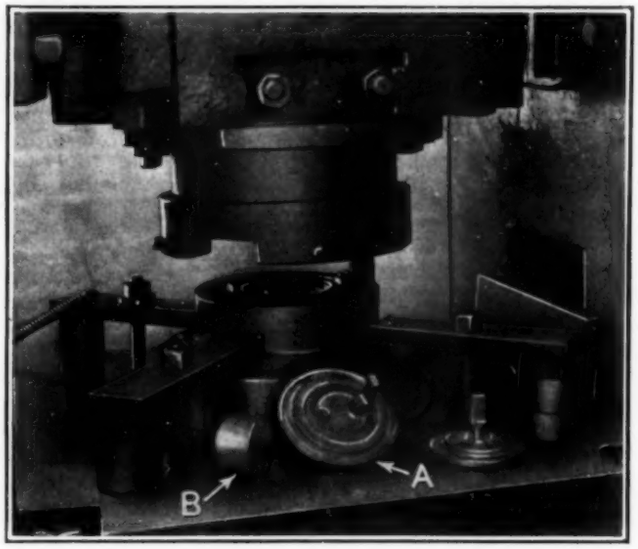


Fig. 6—Here is shown a set of forging dies set up ready for use in a press. The upper and the lower dies, made of high-speed steel, round in shape, produce the float-valve headers shown on the bolster. A cut-away section in the upper die rings provides clearance for loading and unloading

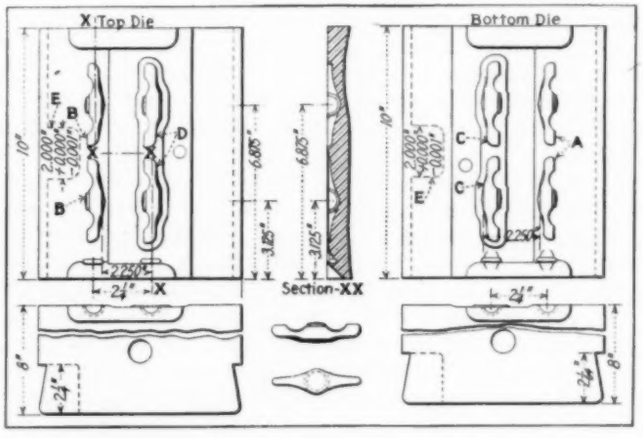


Fig. 7—Dies of the drop-hammer type resemble regular forging dies. Two pieces at once are forged from the end of a heated bar. Several strokes of the hammer are required to complete the forms which are first broken down in the roughing impressions

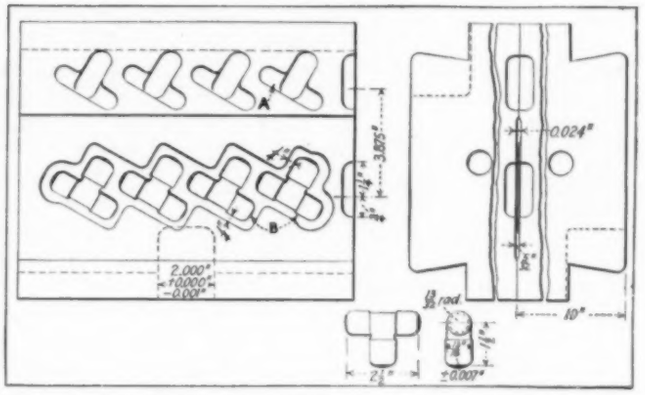


Fig. 8—Drop-type dies that forge four pieces simultaneously. Both die sections have key slots machined in them so that they can be aligned and will match accurately in the hammer by means of keys located in the sow block and in the ram

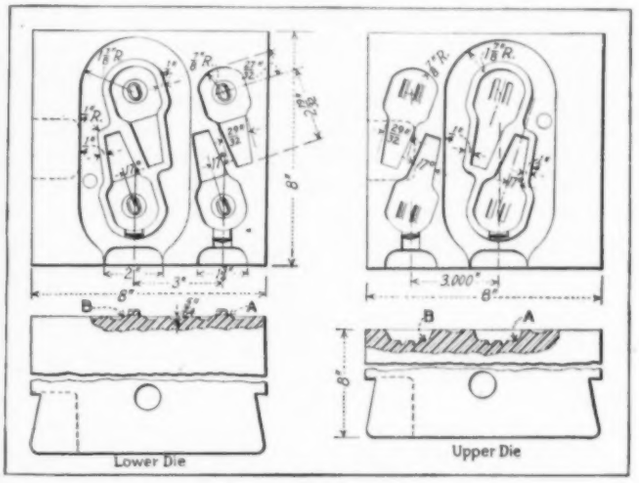


Fig. 9—Example of drop-forging dies for an intricately-shaped part, made from a bar 13/16 in. in diameter. After being hammered in the roughing impressions, the parts are formed to resemble the finished piece, although the fillets and drafts are more generous

Their construction resembles that of drop-forging dies used for other metals, although the faces and the impressions are machined more accurately in order to correspond with the tolerances of the part to be forged. A set of dies for a regulator handle is illustrated in Fig. 7, the lower die being shown at the left, and the upper die at the right. The roughing impressions are shown at *A* and *B*, and the finishing impressions at *C* and *D*. Two pieces are forged at once, these pieces being trimmed simultaneously in a succeeding operation. Both die sections have key slots machined in them as shown at *E*, so that keys, located in the sow block and in the ram of the hammer will match the dies accurately, thus simplifying the set-up when changing from one job o another. The material used for this part is a bar $\frac{21}{32}$ in. in diameter and usually two sets of handles can be made from one heating of the bar.

Another set of dies, similar in nature, although arranged for making four pieces at a time, is illustrated in Fig. 8. A brass bar $1\frac{1}{8}$ in. in diameter is used, but only one set of forgings is made from each heating of the bar. In Fig. 9 is shown a set of drop-forging dies for a flat part, somewhat more complicated than the other examples. The roughing impressions *A* merely

break down the bar, giving it an outline approximately that of the finished specification. More generous fillets and drafts are allowed, however. The finishing impressions *B* are made with a flash-clearance $\frac{1}{4}$ in. in width and a gutter $\frac{5}{64}$ in. in depth. The size of the bar from which the parts are made is $1\frac{3}{8}$ in. in diameter.

In designing forging dies, one of the most important factors to consider is the arrangement of the impressions. The parts should be laid out so that the amount of space between the impressions is held to a minimum. The examples illustrated show efficient layouts, two of which necessitated turning the part in an angular position.

The headpiece illustrates the arrangement of a press and a furnace used in making forgings from slugs. One operator transfers the slugs from the furnace to the die, and the other operator trips the press and removes the finished forging. The heat of the slug is important because an overheat will enlarge the grain of the material to such an extent that only the remelting of the brass will bring it back to a proper condition. The same is true with bar material. An overheated forging develops cracks around the flash, and sometimes in the thinner sections of the body. The average forging is made from a metal having an analysis of 59 per cent copper, 39 per cent zinc and 2 per cent lead, and requires a heat of 1,400 to 1,450 deg. F. Other materials, such as nickel-silver brass, having a white appearance, and acid-resisting alloys, necessitate different heats, although the forging procedures are similar. Forgings made either in a press or in a hammer can be held to ±0.005 in. if necessary. In most cases, however, tolerances of from ±0.007 to ±0.01 in. are specified.

In making brass forgings, each piece requires careful study before the dies are laid out. The outstanding factors to consider are the method of forging, that is, whether a press or a hammer will be used, and the size of the machine in which the job is to be handled. The latter precaution largely governs the success of the forging of brass. The size of the part does not control the forging pressure so much as does its general outline. A small part may require more pressure than a larger one, especially if the impression is thick and deep. No rule can be given in this respect, as it is a matter for experimentation before deciding. The speed of the blow, too, is important and, as a rule, requires further experimentation. In Fig. 10 is illustrated a group of brass-forged parts that are typical of the shapes most commonly made in the types of dies described.

Fig. 10—A typical group of brass-forged parts made by the power-press and drop-hammer methods. Such parts can be held to ±0.005 in. if necessary, although the general tolerances are from ±0.007 to ±0.01 inch

Torch Cutting in the Railroad Shop

IN SPITE of opposition of various kinds, the cutting torch has made a place for itself in railway shop work. Grave doubts as to the effect of the intense local heat on the structure of the metal have given way owing to the extended use of the torch without noticeable failures. It seems to be generally accepted that if a reasonable amount of metal is left for removal after cutting, or if the steel is properly heat-treated, or both, all injury that may have been done will be counteracted.

Locomotive connecting rods are subjected to severe stresses, and in alternating directions. Yet there are many railroads using the torch method of cutting the rough forgings to a close approximation of the finished shape. This method of cutting saves a large amount of machining and is now considered as safe as the more expensive methods of forging much closer to size, or of machining large amounts of metal.

Whenever the slotter and the milling machine come into real conflict, it is usually on the basis of cutter cost. There seems to be little question as to the milling method being much faster than slotting, but the cost of the milling cutters bars the way in some railroad shops. Nor is this the first cost alone, it is the breakage and the upkeep costs, both of which are probably larger than in regular manufacturing establishments.

There are, on the other hand, railroad shop men who feel that there is no question as to the superiority of the milling method for practically everything except, perhaps, machining the pedestal jaws on locomotive frames. The increased speed that is made possible by the continuous cutting of the tool in milling is felt to more than repay any cutter cost, if the cutters are cared for properly.

One particular bone of contention is the machining of shoes and wedges. Here again it is the question of cutter cost, whether the shoes be of brass or cast iron. All admit that milling is faster, but again the cutter cost is in dispute.

In both cases, the quality of the metal seems to have much to do with the success attained by milling. Sandy castings are too apt to be found and they are hard on any form of cutting tool. The single tool, as in the planer, can, of course, be reground and set more quickly and at much less cost than the milling cutter. Hence the leaning toward planing in many cases. It is quite probable, however, that more care in securing clean castings would be advantageous, regardless of the method used.

In one month last fall the railroads produced over 44 billion ton miles of transportation. And the average freight car movement was 32.2 miles a day, the highest on record.

· BOOK · REVIEWS ·

PROHIBITION: ITS INDUSTRIAL AND ECONOMIC ASPECTS. By Herman Feldman, assistant professor of industrial relations, Amos Tuck School of Administration and Finance, Dartmouth College. Four hundred and five pages, 5x7½ in., cloth covers. Published by D. Appleton and Company, 35 W. 32d St., New York City. Price $2.

IN SPITE of the spirit of levity with which the Volstead Act is frequently treated the effect of prohibition economically and industrially is a matter of grave concern to every individual and every industrial unit. Rightfully, each should understand the facts so far as he can before deciding whether prohibition is a benefit or a calamity. Professor Feldman's book will help in reaching such an understanding.

No evidence of the author's personal opinion or of prejudice is noticeable in the book. It contains statistics, statements of fact, results of inquiries made of industry, all of which were obviously collected by means of much effort and with great care. Analysis and conclusions, when made, are impartial, but for the most part the reader is left to make his own deductions and draw his own conclusions. One impression he cannot help receiving is that prohibition in all its influences is of much greater importance than most people realize.

In view of the many conflicting statements made for and against prohibition, many of them based on insufficient or no statistics, Professor Feldman's book should be read by everyone earnestly seeking to decide what should be his attitude toward prohibition as it concerns industry and economics

HARVARD BUSINESS REPORTS. Volume 4. Cases on Labor Relations. Compiled by the Graduate School of Business Administration, Harvard University. Five hundred fifty-nine pages, 6x9 in. Cloth board covers. Indexed. Published by A. W. Shaw Company. Cass, Huron and Erie Sts., Chicago, Ill. Price $7.50.

THIS book is a remarkable compilation of selected cases dealing with administrative problems connected with labor relationship. The cases were selected and edited by John W. Riegal, formerly instructor in labor relations at the Harvard Graduate School. They give the actual conditions surrounding the problems, the minutes of shop conferences between the management and the employees' representatives, and final commentaries by experts in industrial relations. The publisher's statement that "hunch" decisions to personnel problems will not build up proper relations between employer and employee, is well taken. No executive can hope to settle personnel and labor questions without adequate knowledge of reactions in other and similar situations.

The book takes up 73 actual cases in various plants, and includes questions on more than 700 management topics. It includes discussions of the problems of hiring, discipline, firing, demotion, stock ownership, wages, promotion, union disputes, training, accidents, and unemployment reduction. Fictitious names of the companies are given, but all details are included that are necessary to state each case fully and outline the issue. The commentaries at the end of each case usually give the answer that would have solved the problem. It is a book for executives who do not wish to leave their personnel administration to chance or "hunch," and who desire data on what others have done.

COMMERCE YEARBOOK, 1926. VOL. II—FOREIGN COUNTRIES. Compiled by the Bureau of Foreign and Domestic Commerce. Six hundred forty-two pages, 6x9 in., with nine maps. Sold by the Superintendent of Documents, Government Printing Office, Washington, D. C. Price $1.25.

FOR the first time the Commerce Yearbook has appeared in two volumes, and this second part covering foreign data is a remarkably well compiled volume. It takes up in alphabetical order sixty-one countries of the world, and the four noncontiguous territories of the United States, giving the latest information on business and trade conditions, and the latest available statistical data on each country. It then devotes ten pages to a general survey of international trade, with tables and reference maps. Finally, forty-two pages are devoted to comparative world statistics, covering a great variety of important commercial items such as pig iron, petroleum, iron ore, copper, coal, and many agricultural and pastoral products. While the book is intended primarily for those directly interested in foreign trade, it is a reference book that should be in every business library.

TRADE ASSOCIATION ACTIVITIES. Published by the Bureau of Foreign and Domestic Commerce, Department of Commerce. Three-hundred eighty-three pages. Copies can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 75 cents. The purpose of this publication is to indicate the successful service of trade associations in public interests. It discusses in detail the following phases of trade association activities: the organization problems of trade associations and the way in which these are commonly met; the legal status of the statistical activities of trade associations; service of trade associations in promoting uniform cost accounting; the encouragement of co-operative research by trade associations; simplification and standardization in industry; public relations and co-operative advertising; trade relations and arbitrations; and a detailed treatment of trade associations in connection with the industries that they represent. The text closes with an outline of the vast number of contacts that associations maintain with the government.

FOREIGN COMMERCE AND NAVIGATION OF THE UNITED STATES. CALENDAR YEAR 1926, Vol I. Five hundred forty-three, 9x12-in. pages. Published by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. Price $1.75. This volume contains summary tables of foreign commerce, with both exports and imports for the year 1926, together with the principal domestic commodities exported during the years 1922 to 1926. It also gives tables of exports and imports of the chief commodities by countries of origin or destination. Under "Imports entered for consumption," the quantity imported of each item is given, and also the rate of duty paid. The usual statistics on the vessels entered and cleared from American ports are tabulated. The book can be purchased from the Superintendent of Documents, Government Printing Office, Washington.

Handling Decreased Production

JOHN HAWTHORNE, managing the Ranley Manufacturing Company, had sent for William Holland, adviser on management problems, rather than for an efficiency expert. Holland doesn't pretend to be a Solomon, but he has had years of experience and is blessed with a wide acquaintance, plus a goodly supply of common sense. And Hawthorne wanted some of his advice. He builds a machine that has a fairly heavy bed and several units of mechanisms that go to make up the complete machine. Orders have not been coming in as frequently as they did a few months ago. So he wanted advice as to building up a stock of machines.

"Shall I begin to lay off men or shall I build up a stock of machines, Mr. Holland?"

"That isn't a question to be answered off-hand, Mr. Hawthorne—too many factors involved. Some of them are about as follows:

"Are your machines standard or special?

"How much cash reserve have you to put into a stock of machines if it seems best to do so?

"How much more will it cost you to build machines from hand to mouth than it does now?

"How long will it take you to get into production again if you don't build for stock and how much will it cost?"

"Some questions, Mr. Holland. Just what difference does it make whether we have a cash reserve or borrow money to finance the building of machines?"

"If your machines are special, it's taking a long chance to build any sort of a stock, especially of complete machines. If you have standard units that can be used in several machines—or all of them, so much the better.

"The main advantage in using your own cash reserve is that if you lose it you don't have to pay it back to anyone. But there are cases where it has paid to borrow a lot of money for building a stock of machines.

"There was my old friend Fred Rand who built engine lathes, years ago when engine lathes were standard shop equipment for any kind of manufacturing. Rand always built and stored a lot of lathes in dull years, borrowed to the limit at times. And he always reaped a harvest, because when the demand came back—as with the Russo-Jap war, for example—Rand was the only man who had lathes in stock. But if he did the same thing today, when lathes have been so specialized, he would probably lose out."

"Why should it cost more to build fewer machines, Mr. Holland?"

"Your overhead goes up in proportion to your output. Consequently each unit costs more. Then, too, you rarely get as much work per man when work is slack, as there seems to be an almost inherent tendency to 'nurse the job,' perhaps without realizing it."

"But I can't force orders by keeping the shop running, Mr. Holland."

"Of course not. But if it becomes necessary to cut down on production you must count on your work costing you more than when running at normal capacity.

"There's another plan that sometimes works out, Mr. Hawthorne. One of my friends had a similar problem a few years ago. He analyzed his line of machines and found that there were several units common to all. These units represented the greatest amount of labor and the least material.

"So, instead of tying up capital in cast-iron machine beds that had comparatively little labor, he kept his best men by concentrating them on these units. As he put it—he stored labor instead of material. Then when orders picked up again he machined the beds and heavier parts, took the units from stock, and assembled machines.

"The less you have to disrupt your organization, the more easily you can get back into production, the less the work will cost, the better will be its quality, and the more loyal force you can maintain."

"Guess that's a good plan to look into, Mr. Holland. I'll see how it fits into our line of work."

Executives are invited to discuss the problem involved in the foregoing case. Accepted contributions will be paid for.

Discussion

How Much Shall the Proprietor Draw in a Small Shop?

There are assuredly some mighty salient points in Mr. Holland's analysis of the problem. These points should certainly not be ignored, and to be thoroughly conscious of them is essential to an intelligent understanding of the basic problem involved. But to actually charge for all of them as Mr. Holland suggests is to my mind at least questionable. In this day of modern production methods, unless the small shop starts out definitely as a specialty shop for certain lines of precision work, its only reasonable excuse for being is that it hopes to develop into a large shop.

If the latter is its avowed objective, then it must stand ready to meet competition. We all know that the large shop will take a small order, development work they'd call it, in the hope that if the product and the organization prove successful, they will be favored when the production order is placed. So, if the large organization takes this small initial order at no profit or a slight loss, charging it off to development, advertising, expansion or what they will, it is necessary for the small shop to meet this competition. If the prospective job is one that has a possibility of leading into repeat orders within the range of its present or planned future equipment, the small shop should hold its price down to meet competition. After all, it doesn't have the inevitable overhead of the large organization. But if the proposed job is obviously a single unit with no future prospects, it should be charged at full costs for everything.

The proprietor of any small business is in business for himself because he believes in himself and his future—and to attain the maximum return on that future he must sacrifice and discount some of his present for it. Gradually, by intelligent observation, he should be able to weed out the non-profit type of job from his shop and concentrate more and more on the strictly paying jobs. That is management, and unless he feels capable of assuming this burden, he will profit better if he returns to his tools and works for wages.

—Irving W. Flierl.

Charging a Profit on Material

Mr. Holland's observations on the cost of buying material are certainly pertinent, and a very clever and interesting presentation of the problem. Basically, I agree with him that it does cost money over and above the amount that appears on the bill to buy raw material. But I do not agree that it should be charged as a percentage cost on the price of the material. This method, though it appears direct at first glance, is hardly so, for it takes just as much "indirect" effort to buy one sheet or $10 worth of material as it does to buy 100 sheets or $1,000 worth of the same material. So it may at least be argued that it is just as likely to be a fixed charge as a percentage charge.

Inasmuch as the small order is generally accepted, not for the profit it will yield, but rather in expectation of future business, I would not make it a fixed charge. Rather I would include it as a part of my general overhead and apply it exactly as I would my office charges, bookkeeping, rent, equipment, etc. This would not only simplify the application of the charge but provide a fairer distribution, as it falls in the same category as "overhead" in general. In fact, if it were my policy or the custom of my industry to submit detailed estimates or prices in contracts, I would once and for all make an intelligent analysis of what my overhead comprised, write it up in an interesting little folder—quote "overhead" as a single item on my bids and enclose a copy of the folder as my explanation. Facts are facts, and "overhead" is one fact that too often has had its light hid under a bushel.—Raymond C. Bewley.

Where one is fortunate enough to still be in that happy position of being able to charge for his profit "what the traffic will bear," and is merely casting about for convenient hooks upon which to hang various "extras" in building up his cost, I suppose that a charge for material handling is as good as any other way in which to build up a cost item.

However, whether such an item is dubbed a "profit on material" or justified as a "handling cost," the fact remains that it is not a legitimate extra, always assuming that the remaining items in a gross cost are properly obtained.

In the event of the industry being anything but the smallest of establishments, such functions as specifying, ordering, following up, and receiving of material are the tasks of definite departments or individuals such as engineers, purchasing and stores departments, so that any cost entailed in the handling of material becomes properly a part of the general overhead.

Where the shop is a one-man affair as regards supervision and administration, these functions are still handled in a combined form by the proprietor, who in turn makes a definite charge for his services to the business.

In either case, therefore, the costs covered by any handling charge are already included in some form of the burden, which the gross cost must carry legitimately, and any attempt to add a further charge to a customer's billing would be

nothing but a doubling-up proposition as far as those particular items were concerned.

Where price competition is at all keen, such a method as countenanced the use of a "profit on material" or a material handling charge under any other guise in addition to the regular material, labor and overhead items, and quoted prices upon a basis of any accumulated total of all of these items, would inevitably spell a loss of business, because of prices "out of line" with competitors' prices.

The first essential in any profitable pricing is an accurate and comprehensive cost-finding set-up, and in such a set-up any items of expense included in any "profit on material" charge would be adequately covered in a more legitimate and business-like manner than could possibly be the case in any method such as that suggested in Mr. Holland's discussion. —D. C. WRIGHT.

Any properly-conducted business must charge its customers for the cost of purchasing, handling and stocking the necessary materials. The problem is only whether this expense shall be merged with all the other overhead expenses of the business, being charged the customer as a certain percentage added to the labor cost of the job; or whether the customer should be charged separately for "labor overhead" and for "material overhead." One method is just as honest and as fair as the other. The first system is more generally followed because it simplifies the bookkeeping; but it necessitates charging the customer an hourly rate for a workman's time, two or three times the rate paid the man. This often seems exorbitant to those unfamiliar with manufacturing, particularly to wholesalers or retailers, in whose businesses 25 per cent overhead would be ruinously high.

Any method, such as adding a 10 per cent charge to material costs, which will make overhead expense more palatable to the customer, should be productive of good-will, provided always that such charges are agreed upon before the work is undertaken. Other items of overhead which may very properly be separately itemized on the bill are tool cost, engineering and drafting, crating and trucking, and the cost of changes made after the work is in process.—C. S. HAZARD.

To Move or Not to Move

The brief in favor of not moving has been ably presented by Mr. Holland. In addition there is the factor of convenience as concerns the prospective customer—he is used to the present location and knows how to get there quickly. If he has done considerable business with Mr. Mason his phone number is known without reference to the book. Then there is the matter of any stationary on hand—the address must be corrected. If the new location does not reflect expansion due to success, but is just a move, the question of stability of Mr. Mason's organization enters the customer's mind. These, and many other factors, small in themselves when taken singly, bulk large when taken in the aggregate.

To occupy a given space means the working out of many little conveniences—a shelf here, a partition there, electric outlets properly located, safety treads on the floor not capable of being economically moved, ceiling brackets not adaptable to a different type of structure, and so on. All these represent expenses or losses chargeable to moving. Mechanics who have worked out an efficient routine according to the existing layout of equipment must work it out all over again, because it is not likely that the same proportions of the floor space will be available in the new location.

Taken in its broadest aspect, the question is not whether he can afford to pay the increased rent, but rather whether he can afford to move. Obviously, if the situation can be taken advantage of to improve and expand the plant, because such improvement has previously established itself as an impending necessity, then the increased rent merely acts as a spur to hasten an inevitable decision. But if such is not the case, the question of moving must be carefully analyzed and weighed before making that decision. —JOHN S. MORASE.

Securing Business By Swapping Machines

Requests for "reciprocity" in the placing of orders are always embarrassing, for they are difficult to refuse, and are often costly to grant. These requests come from varied sources, sometimes even from directors or stockholders who have other connections. Another form of the same thing is the pressure sometimes brought by Chambers of Commerce to induce a purchaser to "keep the money at home" by buying a machine built locally.

A good many demands for "reciprocity" come from those who have already decided to buy our machine, but are trying to squeeze all the concessions possible from our salesman before signing the order. Courageous and positive handling of such cases by the salesman will lose fewer orders than will the weak reply that he will take it up with the firm and see what can be done. The really big-calibre salesman will tell the prospective buyer point-blank that our people do not do business on that basis; that our machine is sold at a fair price, with no padding to enable us to make concessions; and that our machine will earn for the purchaser dividends many times greater than the profit he could make on the sale of one machine to us.

Reciprocity is too often price-cutting under a loftier name, and like all forms of this evil is not a business-getter in the long run, but a business-wrecker. —A. L. SHORT.

Illinois Central Occupies Modern Railway Shops *at Paducah*

By Frank W. Curtis
Western Editor, American Machinist

MEASURING 652 ft. in length and 245 ft. in width, the locomotive shops of the Illinois Central system's new plant at Paducah, Ky., have tracks covering 25 working pits and one stripping pit. There are also two other tracks, one outbound and the other for handling materials, making a total of 28 tracks, all of which are on the southern side of the building. The erecting section of the shop measures approximately 90 ft. in width, so that the longest locomotive in use can easily be handled. The remaining portion of the building houses the machines that are classed as heavy and light, apportioned in separate bays. A layout of the shop is illustrated in Fig. 6, showing the relative positions of the machines.

Machine work is divided into groups, each of which is arranged to handle a stipulated portion of repair work. Sufficient machines were installed to make each group complete in itself without congestion yet avoid the possibility of having machines standing idle and to carry on without having an excess amount of interdepartmental transportation. The work of the groups includes: Frames; cylinders; steam chests and valves; general miscellaneous work, including stokers; bolts; shoes and wedges; brasses; connecting rods; pistons; piston rods; crossheads; wristpins; tools; motion work; driving boxes; engine-truck boxes; and wheels and axles. Each section has a floor sign signifying the work it handles. The repair work is under the supervision of six departmental foremen, who are responsible for all work pertaining to the parts handled.

Among the many features of the building itself are, the use of a glass in the south and west sides that will prevent excessive heat and glare from the sun; electrically operated ventilating windows in the roof that are controlled by push-button switches located at convenient points; and modern wash-room equipment with shower baths and individual steel lockers for each employee.

The machines are of the latest design, each unit being mounted on a substantial concrete foundation to insure freedom from vibration. The flooring is of creosoted blocks, and in front of many machines are placed platforms for the convenience of the operators. Among some of the modern equipment is a Morton 72-in. draw-cut shaper, illustrated in Fig. 7. The machine is capable of handling the entire machining of a cylinder casting with the exception of drilling.

Two 30-in. Diamond face grinders, located midway in the heavy-machine bay, are used for surfacing guides, links and numerous flat parts. One of the machines is shown in Fig. 8 set up for grinding jaws and is equipped

The second article of seven. The third will appear in an early issue.

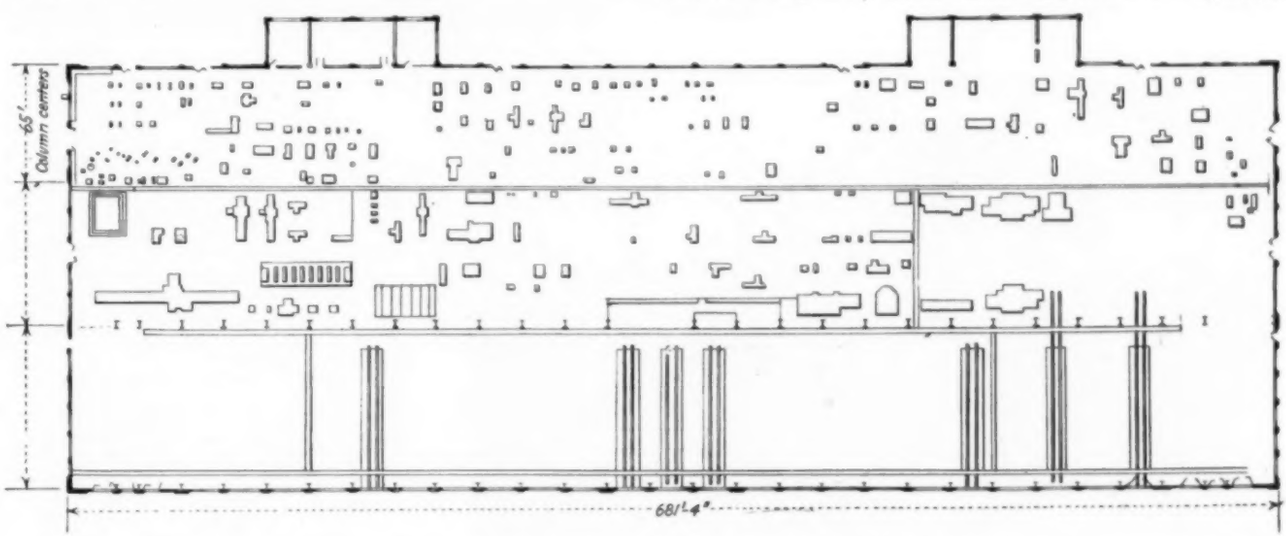


Fig. 6—Layout of the locomotive department showing the arrangement of the machinery in the light and heavy-machine bays. There are 25 tracks over the working pits, and three additional tracks, one each for stripping, outgoing and material storage. Repair work is divided into twelve groups, each provided with adequate equipment to handle the work apportioned to it without having to transport work to other parts of the shop

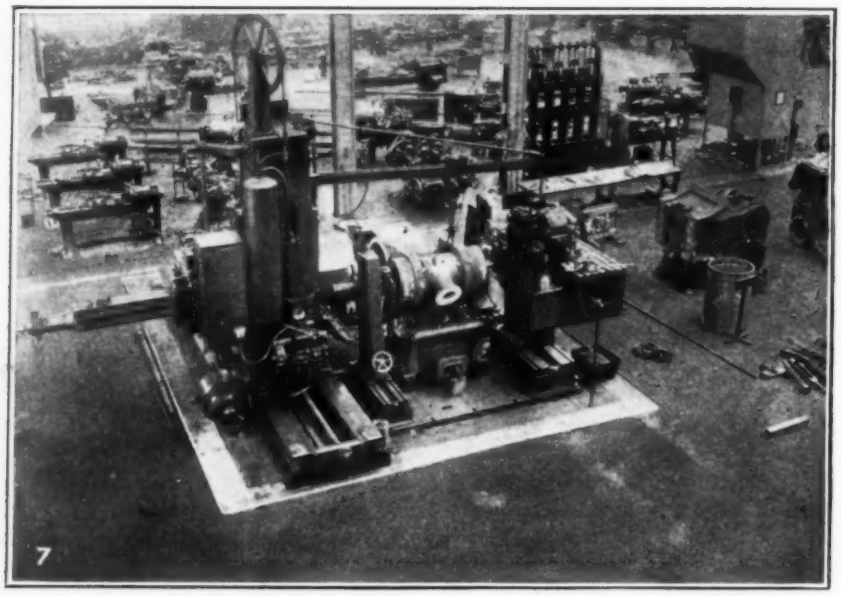
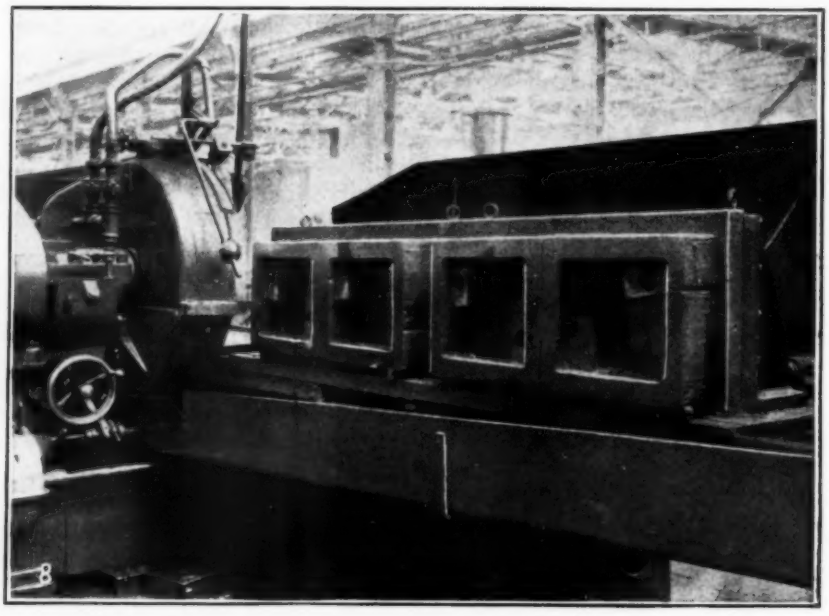


Fig. 7—A 72-in. draw-cut shaper machining a cylinder casting. With the exception of drilling, the machine completes the entire machining of cylinders. It is located in the heavy-machine bay, being served by a 15-ton overhead crane as well as a jib crane equipped with a chain hoist. This unit is mounted on a substantial cement foundation to insure rigidity and permit closer limits of accuracy

with a double magnetic chuck that accommodates eight units. Some parts, such as guides, are held by fixtures, whereas others are clamped on parallel blocks. The machines are driven by 40-hp. motors, and the abrasive wheels are of the segmental type.

Several turret lathes and screw machines of various sizes are located throughout the shop, each of which handles a certain group of parts. One of these, a Libby 26-in. turret lathe, is illustrated in Fig. 9. The spindle will accommodate a 7½-in. bar, so that such parts as knuckle pins, drawbar pins and bushings, eccentric pins, and valve-lifter rods, can be handled. In routing such work, the aim is to run through a number of similar parts in order that the set-up time per piece will be reduced to the minimum.



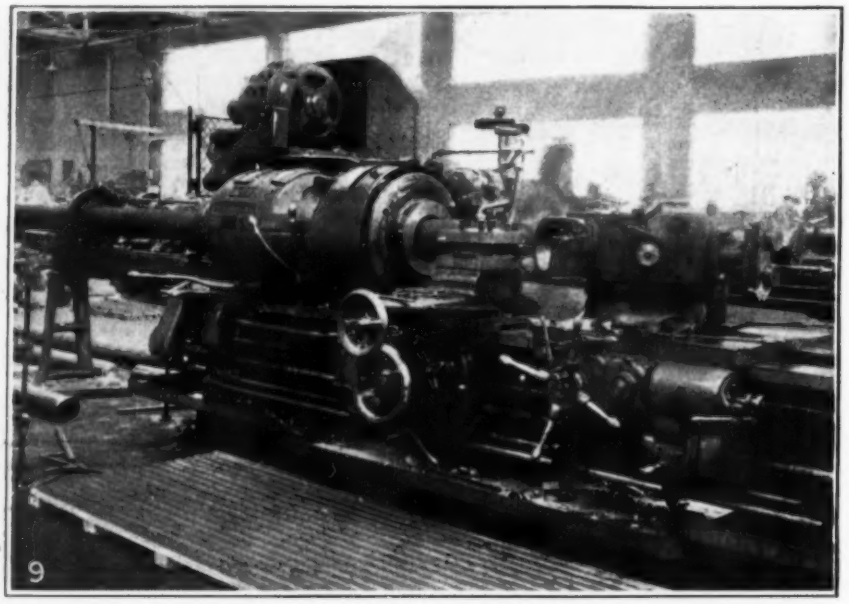


Fig. 8—Two face grinders are used for finishing flat work. Magnetic chucks, special fixtures and parallel blocks are required for the various set-ups. The set-up shown accommodates eight pedestal jaws, held by a double magnetic chuck

Fig. 9—Several screw machines and turret lathes are utilized for bar and chucking work, each unit being scheduled to handle a stipulated group of parts

Who Pays the Cost of Price Cutting?

By Earl Whitehorne
Assistant Vice-President, McGraw-Hill Publishing Company, Inc.

WITHIN the memory of this generation there has never been a time when business men were talking more about the ethics and the economics of price cutting. We are of course in a buyer's market. There is excess capacity and overproduction in manufactured products and an intense competition for orders. But that is not all. We have had other periods when the buyer was in the saddle, riding the salesman whip and spur, just as we have had seller's markets, when demand exceeds supply and the pressure has been upon the purchased—during the war, for instance. And whereas then the salesman was playing one buyer against another for a better price, the purchasing agent today is juggling one seller against another for a lower figure. It is not unnatural. The purchasing agent feels that it is now his time to be the wolf. It is his night to howl. But times have changed and what was once considered a fair game of bartering has come to be a matter of the economics of an industry. For there has been much progress in the thinking of American business. The pack peddler and the patent medicine man have gone their way with their wooden nutmegs and fake nostrums. The days of barter in the village store have given place to a one-price policy in retail trade. Modern business ethics has purged the manufacturing field of many practices that once were looked upon as quite legitimate but now are recognized as unfair either to the customer or the competitor. And now a new advance in the evolutionary process has introduced another idea—the responsibility of business men to protect the economic health of the industry in which they are engaged. In other words the growth of American industry has brought with it an extremely complex inter-relationship among manufacturers, and between buyers and sellers throughout the land. Specialized production has developed a tremendous volume of inter-industry trade in materials, equipment and services, and also large concentrations of capital and industry have resulted in a degree of inter-dependence between the buyer and the seller that has never been known before. And the present discussion of the prevalence of price cutting by manufacturers and profiteering by large purchasers has to deal with these new conditions.

Obviously it is poor business to be a party to a transaction in which either side is going to lose money. That is just common sense. For it usually costs more to win a new customer than the profit on the first order he gives. It is the continuing business from the account that pays and it costs money also for a large buyer to take on a new supplier and establish an understanding of special needs and a dependable service. Usually it costs more than is gained by changing to another line just to seize a slight price advantage on the initial order—which is too often offered as a bait.

But there is more to it than that today. For so vast is the flow of goods and so greatly is the modern buyer sustained in his own business by his suppliers, that a large industrial organization has come to be vitally concerned with the prosperity of the other organizations from whom it draws. Put a manufacturer out of business by rendering it impossible for him to make money and you must look elsewhere for your next shipment of whatever it is you need. Let him live and he will continue to help you make more money. And that is precisely the philosophy that has dominated in those much-heralded cases where a large buyer has examined into a seller's costs and refused to accept cut prices that netted him a loss, knowing that either this selling must hereafter skimp on quality or service or ultimately go to the wall—unless the price level is restored. In the metal-working industry where an expensive engineering type of equipment is involved, the buyer also relies upon the manufacturer for another vital resource. He looks to the manufacturer to advance the art, to conduct expensive research, to carry forward the progress of engineering development. And if the manufacturer is denied profits that are adequate to finance the cost of this, then it will gradually cease and the industry must sacrifice one of its most priceless assets, unless the buyer assumes the burden.

Two things are happening:

One—Purchasing agents of large buyers are rigorously

The purchasing agents of large buyers are being accused of profiteering. The complaining manufacturers are being charged with lack of price courage. What is it all about?

In this article Mr. Whitehorne arrays the major factors in the situation. There will follow a further discussion of "Some Experiences in Price Cutting" in which the methods that are at present demoralizing the market for industrial equipment will be described.

Criticism and discussion of the three immediate remedies offered is urged. Perhaps an even better recommendation can be developed

applying the thumb screws to the manufacturers' salesmen and beating down price levels by ingenious methods of induced competition.

Two—Manufacturers in their eagerness for volume are weakly submitting to this pressure and cutting prices to get orders that net a loss and demoralize their market.

The first reaction is to say—"Well, under the circumstances the purchasing agents are smart and the manufacturers are not. Why worry?" But when you look ahead and ask yourself what the consequences may well be within this highly inter-dependent community of business interests, if this condition should continue very long, you realize that in the end the buyer would suffer with the seller, and the entire industry would be the loser by it all. Large scale profiteering by purchasers, widespread price cutting by manufacturers in this day and age soon become a common problem.

What is to be done? It would seem that the burden of reform would rest upon the manufacturers who possess the right to accept an order or decline it as they wish. But as every manufacturer knows, the demand for volume is a remorseless pressure upon the sales department that must feed orders into the hungry hopper of a modern factory. And since the Sherman Law forbids competing manufacturers to organize for mutual protection against the snares and pitfalls of a buyer's market, each one must take his chances in the open strife, and the price that can be charged depends upon the level of the market for competing lines. Let one sales manager weaken in the face of a persistent price-squeezer, and let a second fall in line, and no other bidder can hope to hold to his figure and secure the business.

Apparently there remains but one legal and practical defense to which the manufacturer may have recourse. That is the organizing of industry opinion to correct uneconomic practices and improve the standard of executive policy among both the buyers and the sellers. In other words, he must broaden the vision of the purchasing agent and stiffen the spinal structure of the sales manager.

The seat of the present trouble, it would appear, lies in the old tradition of the secrecy of bids, for here is the keenest weapon that the buyer is employing at the moment. A group of manufacturers are invited to submit bids on equipment to be purchased. The bids are in. The salesmen call. The purchasing agent thereupon proceeds to privately play each man against the others, telling each that he is high, inciting each to telephone the factory, whipsawing them with fear and hope until the last price cut has been exacted and the last unhappy concession wrested from the profit margin on the goods. Too often he who was the low man at the outset is the low man at the end, but minus profit. Too often also the order was all the time intended for him for some good consideration of the quality or service offered, in return for which he has been mulcted of his company's earning power on that sale. Because of the traditional sanctity of bids, he has been unable to demand a showdown when the bids are in, a chance to see whose price is really high. For there are lying purchasing agents as well as lying salesmen and the temptation to play tricks with truth is sometimes great in buying.

Clearly, therefore, there are three things to be done as an approach to a remedy:

One—Secrecy should be eliminated on bids for standard listed apparatus. Bids are published on government orders. Bids to private purchasers should be open to examination by any manufacturer who is called back and asked for a revision of his price. At present it is not supposed to be morally right to show a bid to a competitor. Where the bid entails a large element of engineering or other variables this secrecy will undoubtedly continue. But on standard listed apparatus—and this covers the major volume of the sales of industry—the buyer should show the bids when asking any bidder to reduce his price.

Two—Salesmen should demand this frank showdown—whenever called upon to cut a price after the bids are in. They should expect it as an evidence of good faith on the part of the buyer. Manufacturers should refuse to consider a concession without this evidence.

Three—The holding of post mortems on competitive bids should be made standard practice among equipment manufacturers, so that losers may analyze all bids and understand their lost business. This is lawful and already is being done to some extent, the exchange of bids being made by the bidders. Of course, this would not end all cutting of prices. It would simply bring the practice out into the open and improve its morals. It would be a step toward an eventual one-price system.

But the seller should not be made to fight for this reform unaided. Purchasing agents individually and as nationally organized should also become the exponents of this idea. It is another step to be taken in the de-bunking of business, the banishing of deceit and trickery from trade. In this era of economic intelligence the gentle art of profiteering by purchasers should be laid away in shrouds along with that once popular commercial slogan —*caveat emptor!*

For men do not buy for price alone. Price is important. But other factors are equally important because they themselves constitute the value for which the price is paid. The chief concern of the buyer should be to see that he obtains a value proportionate with the price. The chief concern of the seller should be to see that he obtains a price commensurate with the value. And these two ideals are not antagonistic. They go together like the well known words—*E pluribus unum*—to use more Latin.

Who pays the cost of price cutting, then? Both the buyer and the seller pay it. And in the end the entire industry suffers.

Standardizing Machine Parts

STANDARDIZATION has long been a dream of forward-looking machine designers and builders. And while progress in this line has been slow, a good beginning has been made by American builders. Most noticeable is the adoption of a standard spindle nose by the builders of milling machines in the spring of 1927. The change was made without difficulty and was welcomed by users. Standard T-slots have been worked out by joint committees of the A.S.M.E. and N.M.T.B.A. and have been adopted by the A.E.S.C. Toolholder sizes are also nearing the point of adoption, while standard tapers are being carefully studied.

Standardization and simplification are being demanded by users, particularly of such parts of machines as affect interchangeability of work and toolholding devices. With chucks and tools that can be used on different machines, the investment in these auxiliaries would be greatly reduced, because both tools and chucks would be in use much more constantly.

Making the Lancia Piston

By J. A. Lucas

PISTONS for the Lancia car are made both in aluminum and in cast iron. The tendency, however, is toward the extended use of cast iron, and most of the operations shown refer to the pistons of this metal. The iron piston casting is very light, as can be seen from the wall of the sectional view shown in Fig. 1. Although well ribbed, one of the problems of its manufacture is to properly support the piston in the various operations without springing either the wall or head. The influence of this consideration on the design of tools and fixtures will be noted from the illustration. Fig. 2 shows the seven stages, from the rough casting at the left to the finished piston at the right. After an inspection of the piston casting, the piston is centered on an expanding mandrel and the boss on the end is drilled and countersunk. The outside is then turned on a stub lathe, as in Fig. 3. In the same setting the head and the lower end of the skirt are faced. The ring grooves are then cut, and the piston-pin hole is rough drilled. The pistons are then ready for heat-treating in a specially-built, electrically-heated oven, as in Fig. 4. The oven is almost like a safe, and holds 300 pistons at once. The pistons are heated to 356 deg. F., this temperature being held for six hours.

Fig. 1—Sectional view of cast-iron piston. This view shows the very thin wall in the skirt and head, as well as below the ring groove

The sequence of operation can be seen from the list at the end of the article, and is given for both types of pistons. The fixture for drilling oil holes is shown in Fig. 5. The piston slips inside the shell shown, being held by a cover plate *A* that is locked in place by a bayonet joint. A screw, operated by the handle *B*, forces the piston against the end of the fixture, so as to insure that the oil holes will be drilled in their proper place. The whole fixture rests in a V-block, and can readily be turned so as to drill one hole after the other without delay. The handle *B* aids in turning the fixture and piston from hole to hole. The total drilling time is 4 min. per piston, which includes putting it in place and removing it, ready for the insertion of the next one. A special lathe has been built for finish boring the piston-pin hole, the essential portions of which are shown in Fig. 6. The fixture for holding the piston and guiding the boring tools is shown in consider-

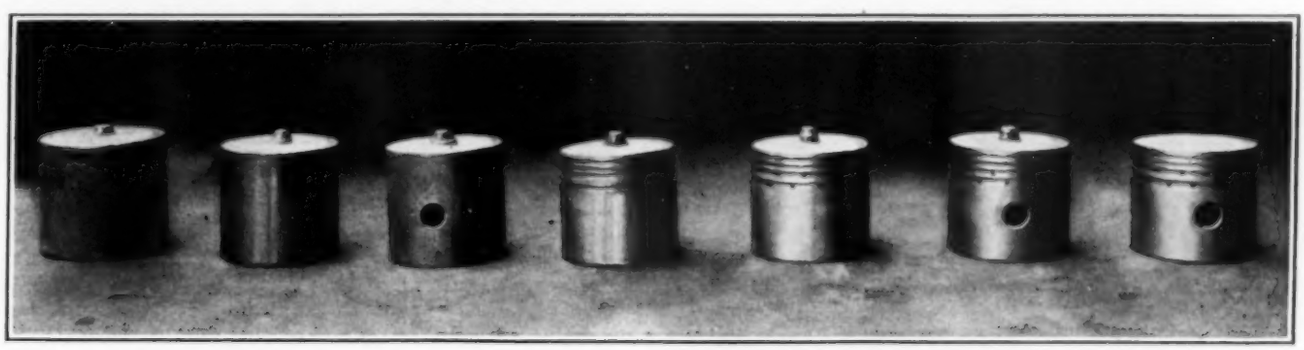
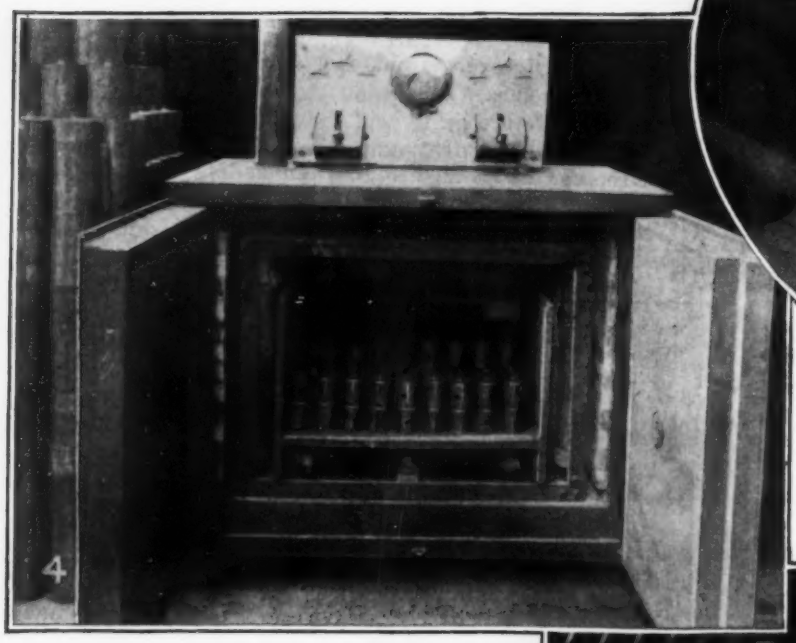


Fig. 2—The seven principal phases of piston manufacture. Beginning with the rough casting at the left, the various machining operations are indicated by the condition of the piston. The pistons of the Lancia engine are somewhat shorter in relation to the diameter than is usually the case in American automobile practice

Fig. 4 — Annealing pistons after rough machining. The specially-constructed furnace, which resembles a safe, holds 300 pistons, and is electrically heated. A temperature of 356 deg. F. is maintained 6 hours



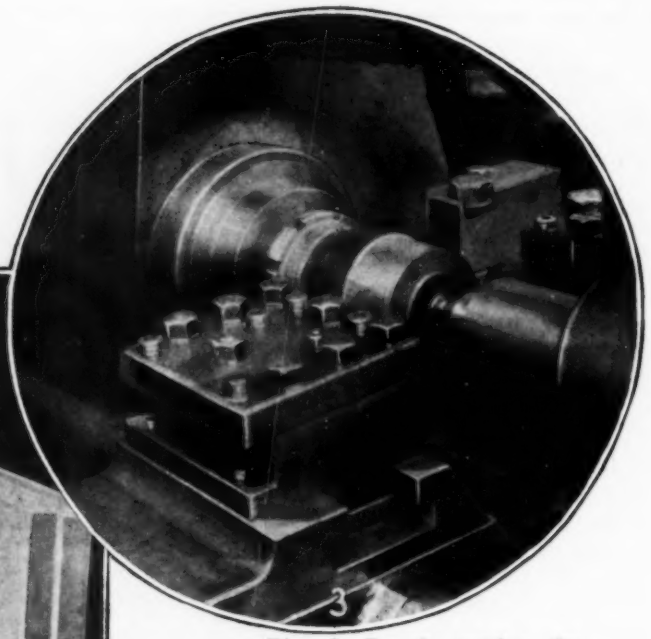
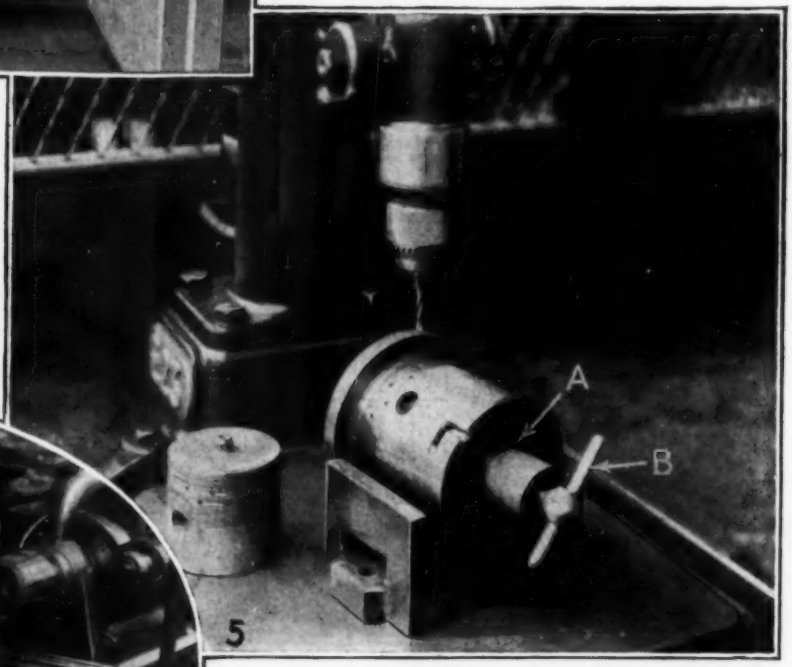


Fig. 3—Rough turning the piston and facing the head. An expanding mandrel centers and drives the piston from the inside, so as to secure an even wall thickness

Fig. 7—Turning the piston to weight. Pistons are very carefully selected by weight, the flange on the end being bored out to reduce the weight to the desired amount



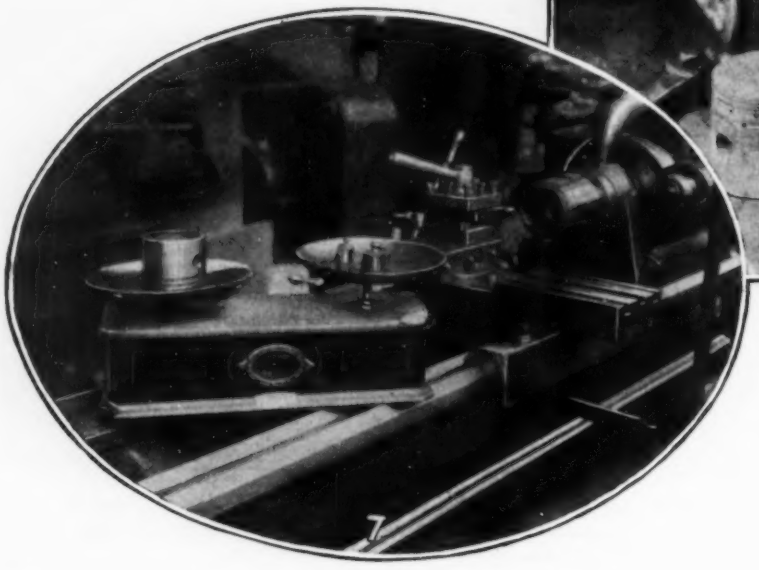


Fig. 5—Drilling oil holes under piston rings. The piston is held in place by the cover plate with the bayonet joint shown, and by a screw through the knurled plate-knob

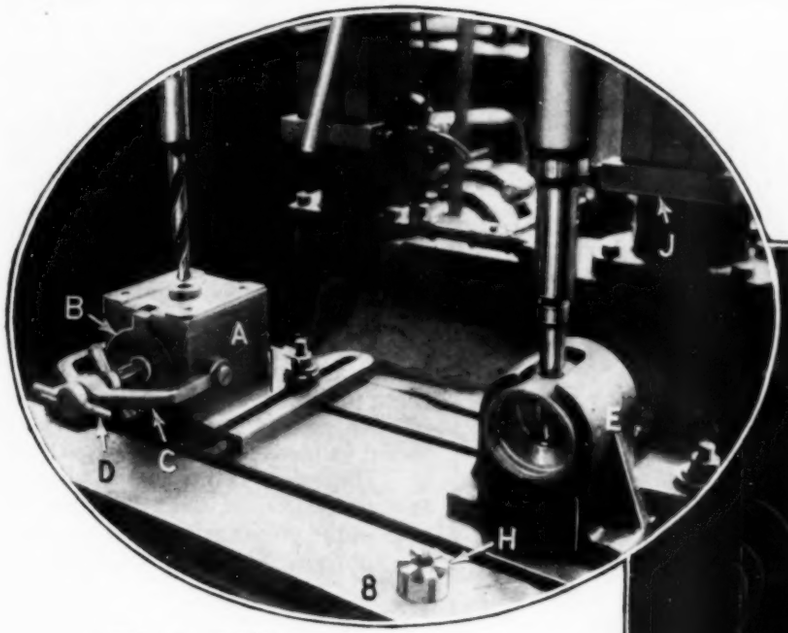


Fig. 8—Drilling and spot-facing aluminum pistons. A similar process is also used on cast iron pistons. The piston is located for cross drilling by forks on the end plate that contact with the piston-pin bosses

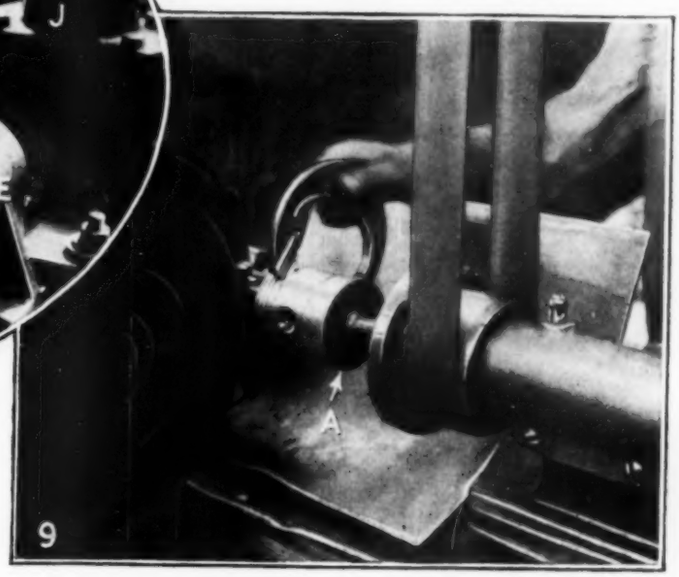


Fig. 9—Grinding and gaging aluminum pistons. This view shows how the piston is centered and driven by a flanged bar entering the open end and having a pin put loosely through both piston-pin holes and the driving bar

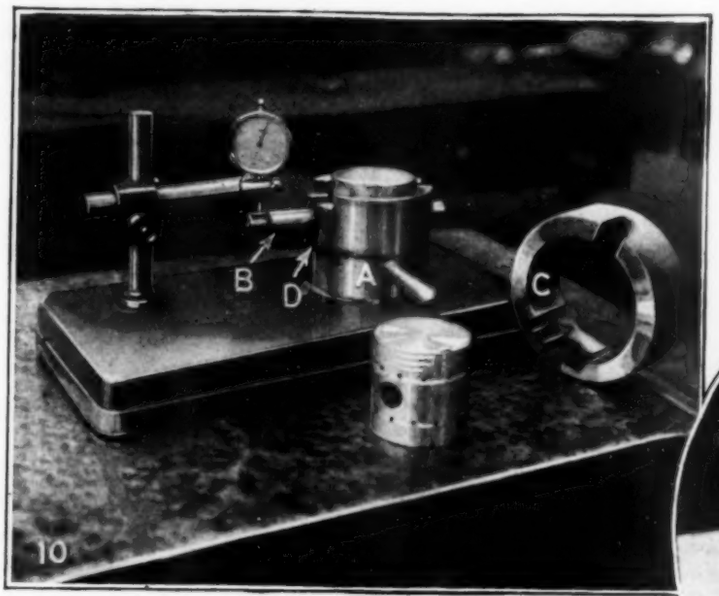


Fig. 10—Checking squareness of piston-pin hole. The piston is mounted in the fixture shown, and a test bar is put through the piston-pin hole. To hold the piston, the ring is slipped over the outside of the fixture so as to force the wedge-shaped block gently against the piston

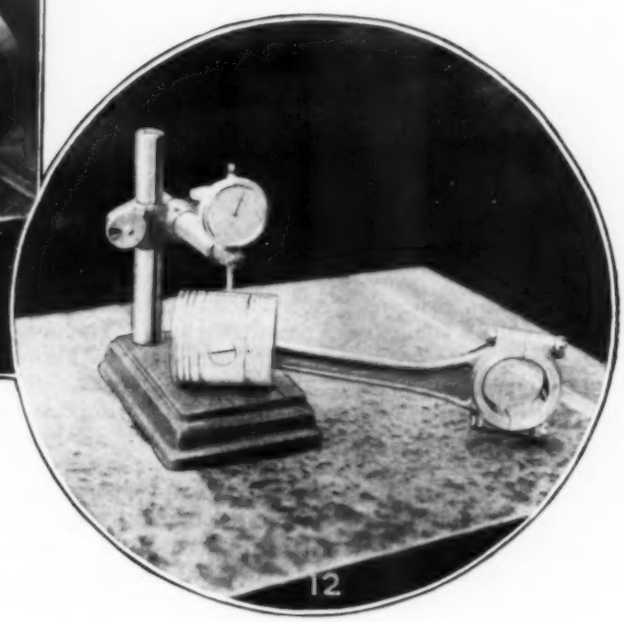


Fig. 12—Testing piston for roundness after piston pins on connecting rods have been put in place. The test is made on a standard form of dial-gage fixture

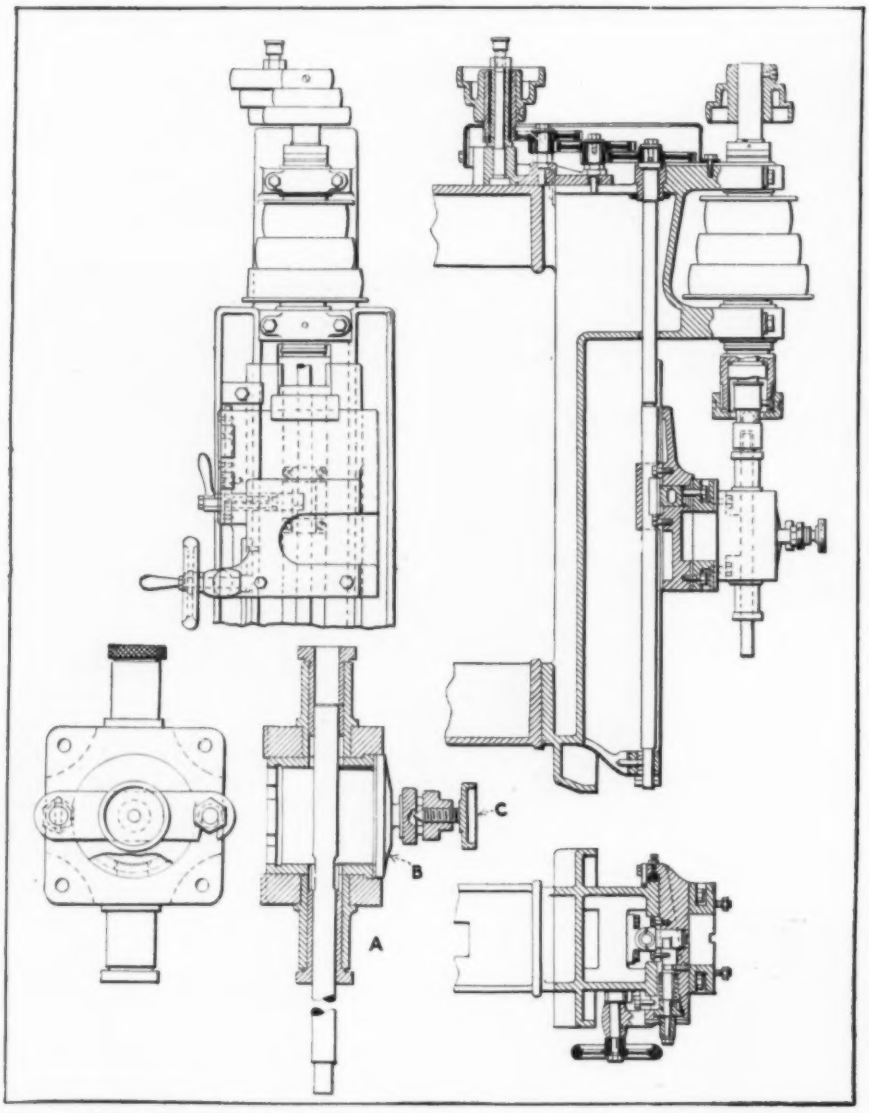


Fig. 6—Special machine for finish boring the piston-pin holes. This machine has a holder in which the piston fits, and is then fed vertically, while the boring bar revolves. The vertical machine is used to avoid possible sag in the boring bar, and to prevent clogging from the chips. The boring bar is supported in long bushings and is driven through a floating connection

able detail. In order to eliminate any possibility of sag, and also to permit an easy egress for the chips, the machine is made vertical The boring bar is driven by a floating holder so as to allow it to be fully guided by the outer bearing in the fixture that holds the piston. The carriage holding the piston is fed upward, the boring bar having no movement except that of rotation. The details of the holding device are shown at *A*. The piston head goes into the opening, and the plate *B* covers the open end, being held in place by the clamping screw *C*. The long bushings shown at each end of the boring fixture form a substantial guide for the boring bar and insure alignment in the assembled casting. The clamping screw *C* is in a swinging link that enables the piston to be easily and rapidly handled in and out of the fixture.

An idea of the care taken in securing pistons of uniform weight may be had from Fig. 7. A special contracting chuck is mounted on the spindle of the Hendey lathe, which holds the base while the flange at the end of the skirt is bored out sufficiently to reduce the weight as may be necessary. The piston is weighed on the scale shown on the lathe bed, next to the carriage. While many of the operations on both the cast-iron and the aluminum pistons are very similar, they are better shown separately. The sequence can be followed from the list at the end of the article. After the outside has been turned and the ends faced, the piston is cross-bored for the piston pin in the fixture at *A*, Fig. 8. The fixture is bored to receive the piston, the plate *B* bearing against the end and being locked in place by the swinging clamp *C*. The screw *D* forces the plate *B* against the end of the piston, and so secures the proper position for the piston-pin hole. The insides of the piston bosses are faced in the fixture *E*, which requires little explanation. The facing cutter *H* is placed between the piston bosses and the spindle is brought down inside the cutter which is then fastened to it. The height of the bosses is controlled by suitable stops clamped to the face of the drilling machine column, as at *J*. There are also two reaming operations on the piston-pin hole, after which a broach is run through, the tolerance being 0.03 millimeter. The aluminum pistons are ground between centers, as in Fig. 9, which also shows the type of go- and no-go snap gages used. The piston is held on a special center *A*, which fits into the open end of the skirt, and is driven by a pin that fits easily in the piston-pin hole. The method of testing the squareness of the piston-pin hole is shown in Fig. 10. The piston is placed in the fixture *A*, with the head down, and a test bar *B* is put through the pin hole.

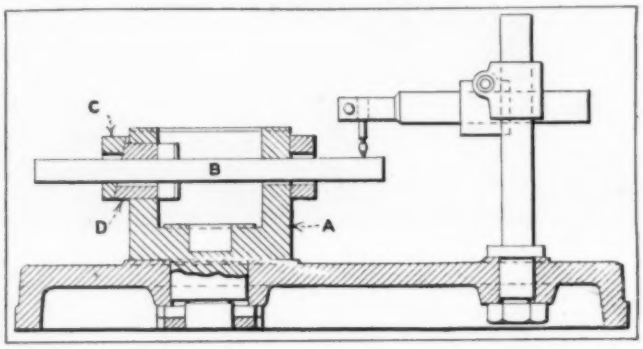
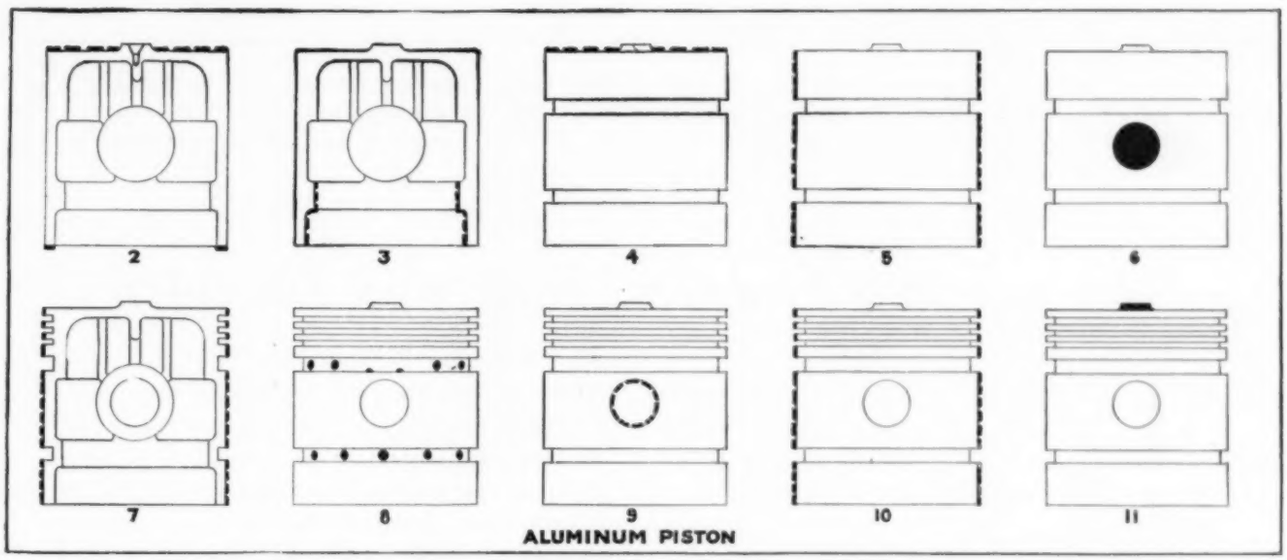
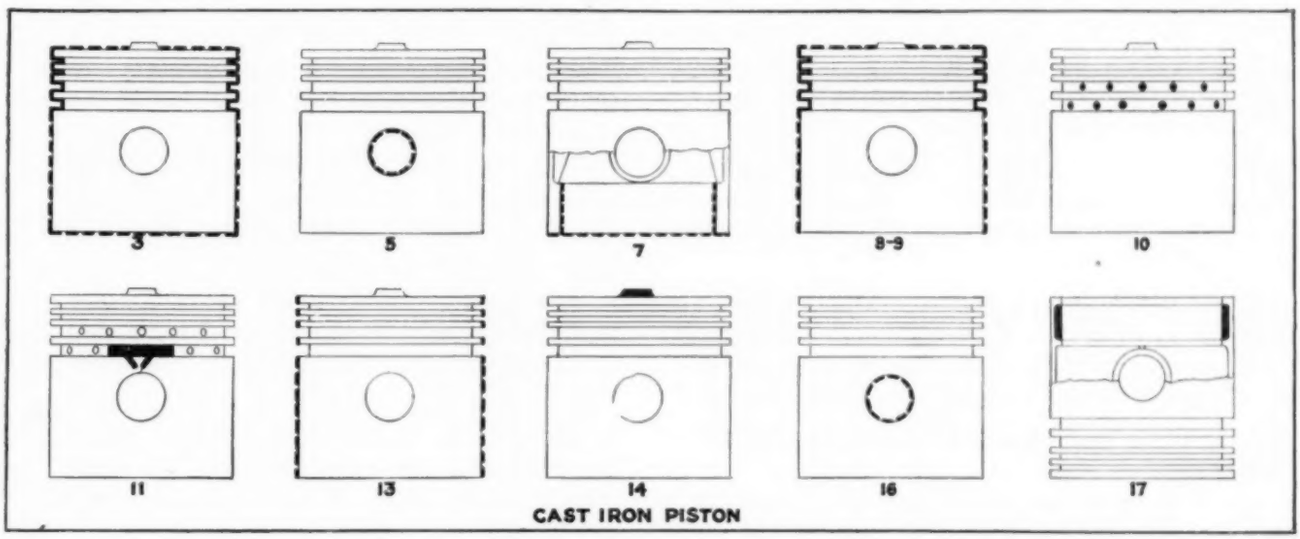


Fig. 11—Details of the fixture for testing squareness of piston pin hole. This shows the construction of the testing fixture, and how the wedge block is forced against the side of the piston



Some of the major operations on aluminum pistons. The sequence of operations is given below

1. Inspection of rough castings. 2. Facing top and open end. 3. Boring skirt. 4. Finishing top. 5. Rough turning outside. 6. Rough boring wristpin hole. 7. Turning ring grooves and finish turning outside. 8. Drilling holes for oil. 9. Finish boring wristpin holes. 10. Grinding outside diameter on centers. 11. Facing off center boss and boring skirt



Some of the major operations on cast-iron pistons. The sequence of operations is given below

1. Inspection of rough casting. 2. Center from inside and drill center hole in head. 3. Rough turn outside and face bottom of skirt. 4. Turn ring grooves. 5. Rough bore wristpin hole. 6. Heat-treatment. 7. Bore inside of skirt and face bottom. 8. Locate from inside of skirt and center, and turn outside diameter to 79.6 mm. 9. Finish ring grooves. 10. Drill holes for oil. 11. Mill pockets for gathering oil on both sides. 12. Rough weight-reduction. 13. Grind outside diameter on center ring. 14. Remove boss on end. 15. Inspection. 16. Ream wristpin hole in special lathe. 17. Reduce to required weight by boring. 18. General inspection of finished product, visual for finish and by gages for dimensions

By rotating the piston on the base of the fixture so that the ends of the test bar can be brought under the dial gage, alternately, the squareness of the hole can be tested with great accuracy.

The construction of the gaging fixture is enough out of the ordinary to be of interest. The piston is a good sliding fit in the base *A*, which is ground on the outside. After the piston is in place, the ring *C*, which is ground on the inside to fit *A*, is put over it so that the inclined surface at the lower part of the ring bears against the wedge block *D* and forces it gently against the piston. The construction of this fixture is shown in detail in Fig. 11, in which the various parts are lettered to correspond with those in the preceding illustration. A test of the piston for roundness is shown in Fig. 12, this test being made after the piston has been assembled on the connecting rod, and shows whether the assembly has caused distortion, and if so, how much. The clearance between the piston and the cylinder wall is held at 0.01 mm. for cast iron, and 0.015 mm. for aluminum.

· THE · FOREMAN'S · ROUND · TABLE ·

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions at the foot of the page have been prepared

Discovering Hidden Ability in the Men

"I SEE you're back, Al. Learn anything at the Springdale Valve Works?" Al and Ed were walking to the train after a day that had kept them both too busy to "visit."

"Funny, Ed, in spite of all I carry in my head I did learn something."

"Don't see how you could possibly find room for another idea, Al. Get a bigger hat in Springdale while you were at it?"

"No, but I may have to later. I feel the growing pains now. Kidding aside, Ed, you know the Valve gang pretty well. Would you have picked Bill Norman to win the biggest prize? And Frank Roach to head the Safety Committee? And George Mace to handle the funds of the Mutual Aid Association?"

"Don't go any further, Al. My heart's weak. Norman have an idea! And Roach on safety! The most careless man in the shop! Then spendthrift Mace handling money! It's too much. But go on with the story."

"Bear up, Ed. I'll get it over quickly. In the first place it seems that Bill Norman always had ideas. Two things caused him to express them—increased family responsibilities and the offer of rewards for suggestions.

"Roach heads the Safety Committee as a result of popular vote. I think the fellows voted for him partly because of his popularity, and partly to play a joke on the super, because they were not too much in sympathy with his new safety plans. Roach didn't take it that way. It seems that because he knew everything about being careless all he had to do was to reverse himself to be an A No. 1 safety man.

"The case of Mace is different. The super did a little lobbying to get the job for him, and did it so quietly that very few knew it was done. He wanted to cure an otherwise good man of a very bad trait, and at the same time use him as an example. Of course, Mace was bonded, and the funds were safe. Beside, he's honest. Well, here's what happened: George actually saw money grow by being in the bank. He saw that if the Association money could grow, his own could, too. Now he has a nice account, and he preaches thrift to everybody who will listen. There you are."

"The shock isn't so great, Al, now that you have explained. But what's the big kick you get out of all this?"

"Just this, Ed, that we probably have a lot of buried talent in our works. I've been thinking ever since my visit that we too often go to the same old standbys for special and responsible service, without making any attempt to discover the hidden ability."

Has Al uncovered a faulty habit characteristic of many shops? Unless a man is tried, how can he ever show that he can shoulder responsibility? Isn't it good psychology in connection with some kinds of work, safety for example, to place the responsibility on a man who might otherwise be an obstacle to successful results?

All foremen are urged to discuss these questions vital to their work; of course the

discussion is not limited to foremen. Letters accepted and published will be paid for

Discussion of Earlier Topics

Side-Tracking an Old Customer

IT IS good to get a new customer, but it is better when the new customer comes from an already satisfied old customer. There is no advertisement so telling as the testimony of users who come again and again because they get what they want. A name for reliability in service and willingness to serve is an outstanding asset to any company. It is not easily attained, and must be carefully guarded. One or two lapses in favoring one customer at the expense of the other, and this good will disappears to the detriment of the company business.

—W. R. NEEDHAM, *England.*

A REPUTATION for prompt service, reliable workmanship, and a dependable product is a business asset that is only achieved by a patient and consistent policy of honest dealing over a number of years. When gained, it is too valuable to be sacrificed easily. The old customer firmly relies on it, and past experience has led him to trust you. He is, therefore, part of your good will, and deserves first consideration.

—J. W. PEPPERDINE, *England.*

Paternalism or Privacy?

FRANKLY, the privacy of an employee's family life should be held sacred. Only as far as company picnics, Christmas parties, and the like, should it be socially invaded by the company. Individual contacts by executives are, of course, highly acceptable. In the case of illness, either of the employee himself or the serious illness of a member of his immediate family, this reserve may be broken down, but preferably by an executive with whom he is acquainted rather than by a company social worker.

At first glance, Al and Ed may have seemed to regard a serious, sincere gesture on the part of the Haines company in a frivolous mood. But that is exactly how nine out of ten of the employees themselves will regard it. The men do not, and will not, accept paternalism in a serious light, for, knowing their fellow men, they are good naturedly suspicious that it's just a pet scheme to save money out of their pay envelope.

—JOHN L. STARR.

IN GENERAL, I believe the men prefer privacy, for that is the backbone of family interest and individual initiative. Paternalism requires that a man override his pride and expose conditions existing in his private family life. Even if the pay remained the same, some men would just not avail themselves of the opportunity for help held out to them. If it involves a reduction in pay, or causes the withholding of an increase in pay, the vast majority of men will oppose it. They naturally have an independence of spirit that makes them want to solve their own problems in their own way. —G. J. MAHON.

THE · NEXT · TOPIC

Too Many Safety Signs

ADVANCE QUESTION

Supt. Williams has the idea that with too many signs men get fed up on safety and that they get either nervous or careless. Ed and Al differ on the question. What do you think?

The Hidden Costs of Accidents

THE items which are generally not thought of in connection with an accident, and which are far greater in cost in many cases, are the upsetting of the man himself, the lost time and disablement features that may accompany any individual accident, and in some cases disablement to the extent of preventing the man from earning anywhere near the pay he was formerly worth. Then, too, when a machine is damaged in an accident and the man must be sent home, the lost time in getting another machine and another man on the job is a big item of expense. You not only have to figure the time it takes to get going again, but also the cost of breaking production promises, and the tie-up of schedules that have been set.

Then, there is the foreman's time to consider. When an accident occurs, he stops what he is doing to take care of the injured man and get the work going again. Most likely if a new man is put on the job, spoiled work is a result and the foreman takes the burden of this increased expense in his department. The foreman loses whether the accident is large or small.

—J. M. SHAPPERT, *Assistant Works Manager.*

Giving Men Credit for Good Work

TO ADMINISTER praise by way of the bulletin board would seem to be taking an awful chance with the effects. Secretly, the majority of us like a little praise, but when publicly given there often seems to be a feeling of insincerity or a tinge of flattery connected with it, which takes away a great amount of satisfaction. Public praise in the form of a public notice might even give one the same kind of feeling that the schoolboy

has when he is called "teacher's pet." A few words of praise by our immediate superior is for most of us sufficient. After a certain period of service of a nature demanding praise, we feel that an increase in pay should be in order. Praise won't buy shoes. —S. C. MARTIN.

Is the Kicker Always a Nuisance?

IT FREQUENTLY happens that the kicker finds fault with conditions that affect every man. By calling the attention of his superior to some objectionable condition, the kicker may be doing what some others would do if they had not to consider the chance of losing their jobs and endangering the income for their families.

—ERNEST SIMONSEN.

IN THIS case Ed did what most others would do, notify the repairman or the maintenance department, and figure that his part of the job was finished. It is, therefore, apparent that Ed was peeved because Bert had called his attention to the hole again after three weeks, which, it must be admitted, is ample time for a minor repair to be made. It would be hard to imagine the condition of a shop, and the accidents that would happen, if the men kept quiet about all the wrongs. Call this type "kickers," if you will, but they are absolutely necessary for the well being of the shop. —WALTER W. YAEGER.

IN PRINCIPLE, Bert Baxter was right. But Ed has many things to think of, and it is at least annoying to have a thing repeatedly called to attention. Bert might have accomplished his objective a little more diplomatically by referring directly to the repair man, or else effecting a little temporary repair himself. Since the repair man had the order, Bert's reminder would have probably been sufficient. Though the individual kick may be justified in fact, too many from the same source are bound to be irritating. —A. A. CROWELL.

They Set Their Own Rates

UNDER no consideration should operators set their own piece rates, especially where heavy production is concerned. Rates set in this way are not properly analyzed, and in most cases are inconsistent. Individual operators have no time to check up on previous operations or equipment, speeds, or feeds. When time and operation are properly analyzed, rates can be guaranteed, production can be anticipated in advance, and the morale of the men in the shop is much better.

—FRANK W. MULRYAN.

Saving the Job of the Careless Workman

IN AN ammunition plant where I was assigned during the war, it was found that more than 70 per cent of the accidents due to carelessness were due to unpleasant conditions in the home. After making an investigation, it was decided to prepare a write-up to appear in the employees' magazine, and give it the most important location in the little paper. A prize was offered for the best solution to the questions involved in the text. This was done to get the workers and the wives to read the text. The prize was offered to women only, and brought out 116 answers, of which eight were ones which we wished to reach. The next week 68 replies were received, of which seven were from those we wished to reach. Of the number intended to reach, only one remained unaffected at the end of two months, and the results obtained were, without doubt, worth many times more than the value of the prizes given. —RUSSELL J. WALDO.

FIRING a man as an example is a questionable practice. There may be times when a man must be let go, but when a man is fired as an example, he is fired to instill fear into the hearts of his fellows, and to teach both him and them to do certain things or live in fear of being fired. But fear is a poor taskmaster. If a man fears his foreman, he certainly will never respect him, and he will go out of his way to put something over on that foreman.

On the other hand, can there be any doubt of Miller's respect for Al, or for Williams? They did him a favor, and he knows it. He knows that they are really his friends. They have removed the cause of his carelessness, and there is no doubt that they have not only saved Miller his job but have saved themselves a good workman as well. —GEORGE BOARDMAN PERRY.

Foremen as Inspectors

ED'S wish for less fussy inspectors is probably inspired by critical inspection of work that had given trouble in assembly. His remark about waiting till a lot is completed before knowing whether it is right, is rather curious, as most firms nowadays have process inspection, or else insist on the first piece of a batch of work being passed before proceeding with the lot. This really is where the foreman's inspection comes in. The men should be trained to inspect the first piece of work themselves as far as possible, and merely get the inspection department to verify this checking. The main idea is to get men in the way of trying to produce work correctly.

—T. GEE, *England*.

Co-Operating on Theory and Practice

I THINK Williams displayed keen judgment in taking Al to that production conference at the engineering college. Success in modern machine production is a co-operative product of all the types of mind engaged in its accomplishment. The research engineer, if too widely divorced from shop contacts, may work out a beautiful laboratory solution to a troublesome problem, only to find its cost prohibitive when applied to actual production. Al, in turn will benefit by the contact, and will see something of the broad basic field underlying a particular problem, and will not be so prone to condemn it if some particular phase is not entirely shop wise. Instead of scoffing, he will realize that to improve it is his particular contribution to the solution of the general problem.

—JOHN W. KANE.

The Panama Canal Shops at Balboa

By Fred H. Colvin
Editor, American Machinist

THE Pacific terminal of the Panama Canal has an ideal location, as can be seen from the headpiece. The country is picturesque, with its hills rising abruptly on all sides, and has a climate that seems to be thoroughly enjoyed by those who like the tropics. The fact that many of the men have been there since the construction days, is evidence that the post has many advantages. The administration building is perched on the hill at the right, overlooking the whole of Balboa. Beyond are the docks and the moorings for vessels of all kinds. The entrance to the canal is at the right of the anchored ships. At the left is the town, while to the right, at the foot of the steep hill, are the shops and dry dock, which can be seen in detail in Fig. 1. This view shows the construction of the shops, the sides consisting of louvers so that they can be thrown open to secure a free circulation of air. And it is said that there is rarely a time when there is no breeze at this point. The crane runways extend out of the ends of the shops, so as to span the tracks on which supplies are brought in or finished work is carried away. In front is the huge dry dock that can handle a 1,000-ft. ship—the largest that can pass through the locks of the canal. The large locomotive crane at the left of the dock handles any heavy machinery that has to be taken out of a

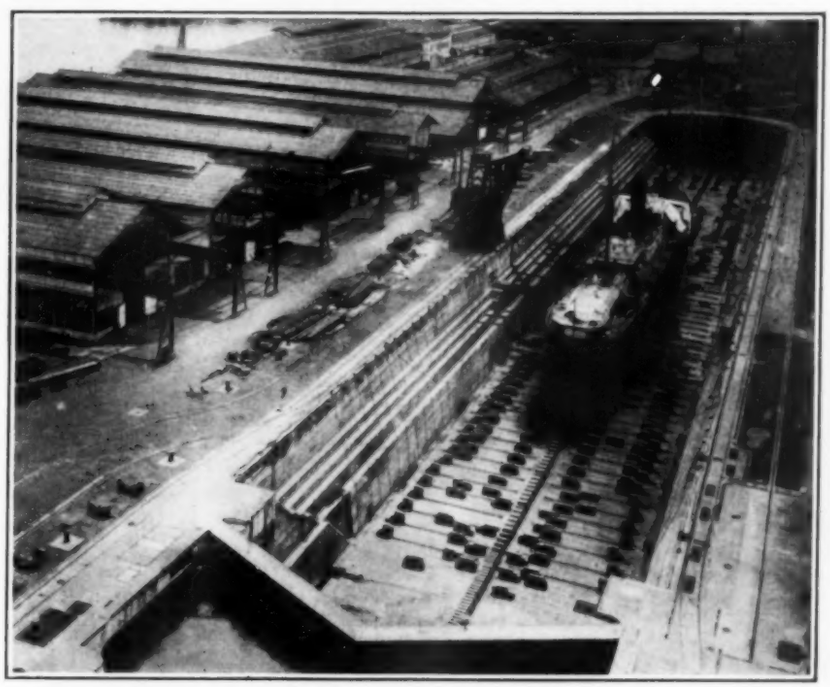


Fig. 1 — Balboa shops and drydock. The crane runways extend from the ends of the shops and span the tracks. The drydock can accommodate a ship 1,000 ft. in length. A locomotive crane handles heavy loads from vessels, and a railroad takes care of the delivery of all kinds of supplies

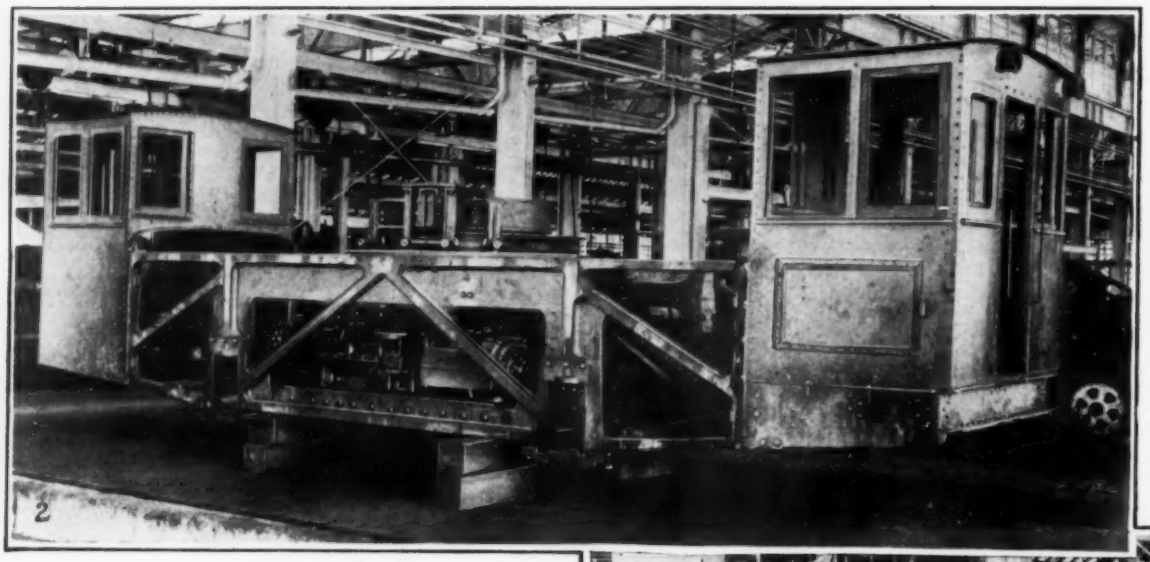


Fig. 2 — Frame and cab of towing locomotive. The later locomotives, or "mules," used in handling ships through the Panama canal locks have been built at the Balboa shops. The frames are of steel castings that are made in their own foundry

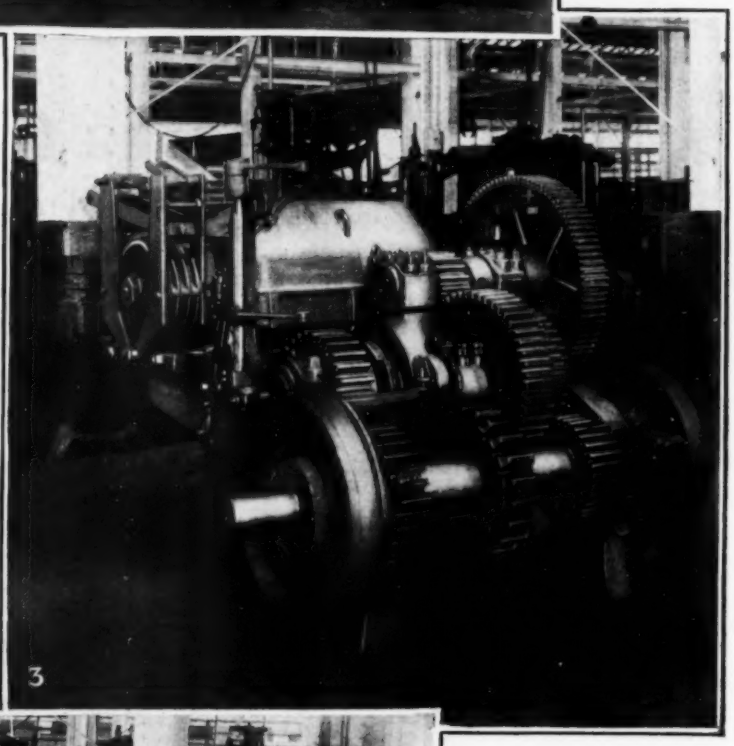


Fig. 3 — One of the driving units. Each end of the towing locomotive carries a complete driving unit of this kind, the gear reduction and the clutch and brake controls being clearly seen

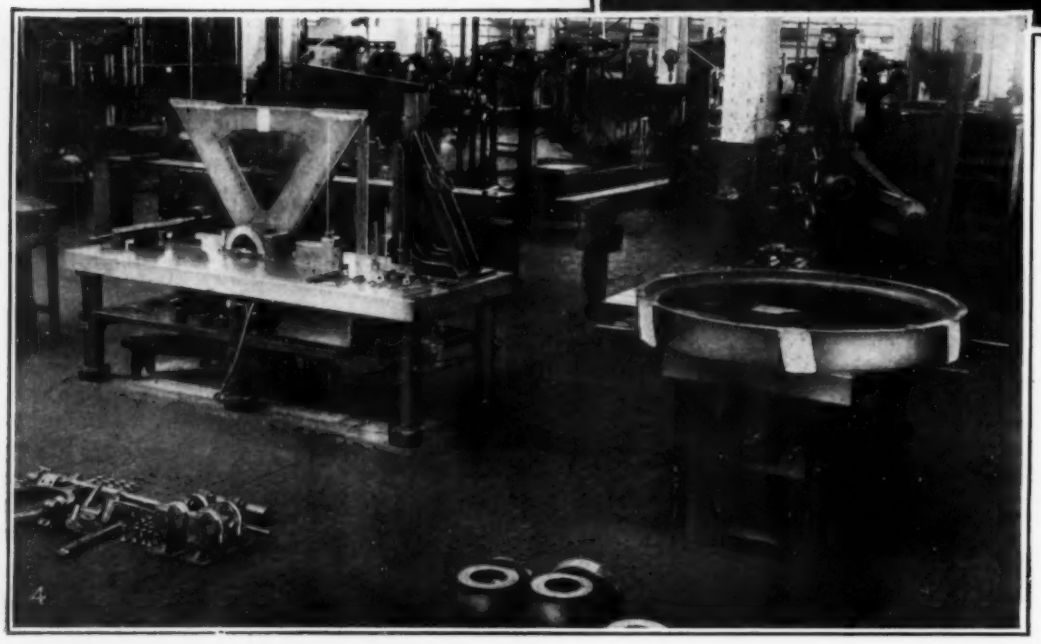


Fig. 4—Two laying-out tables. This view gives some indication of the large amount of laying out work that is encountered in a shop of this kind. The larger table is mounted on a concrete base, and the six supporting legs of steel pipe, together with the tierods, are clearly shown

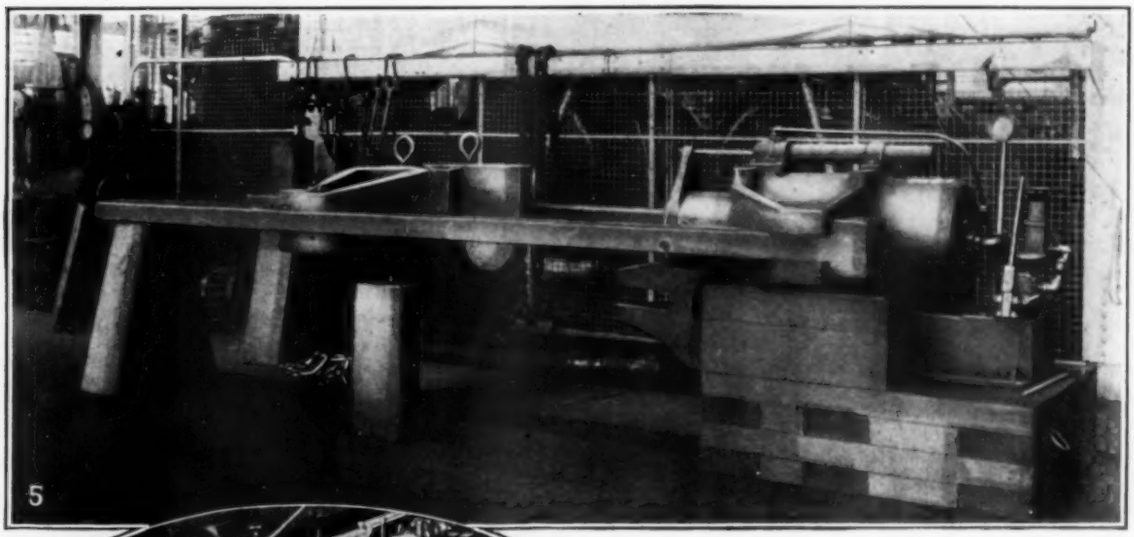


Fig. 5 — Large, portable hydraulic press. In addition to the usual stationary hydraulic press, this portable press has been provided to be carried to any part of the plant

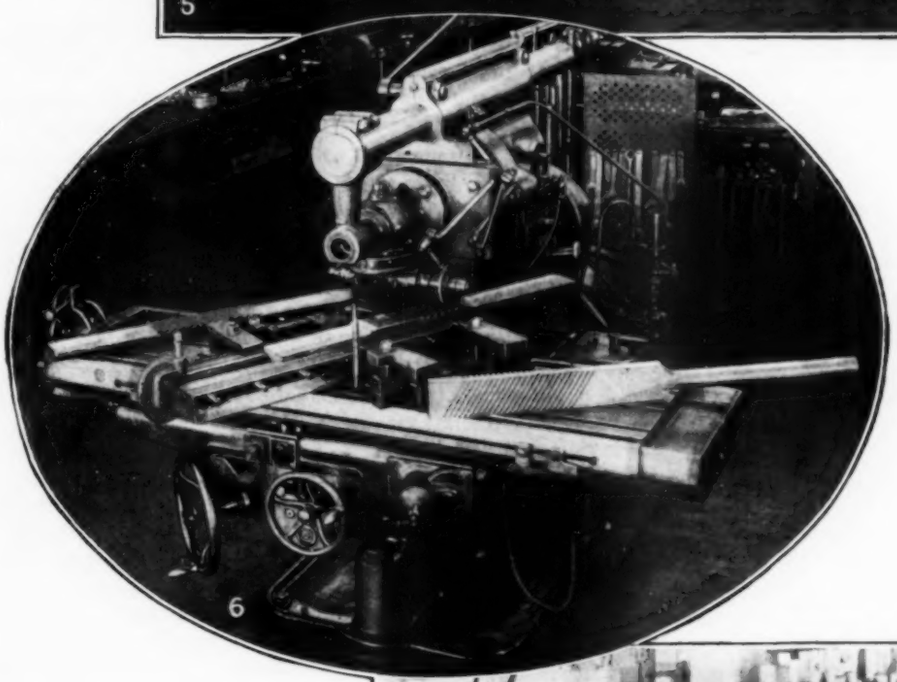


Fig. 6 — Cutting angular teeth in rack. This illustration shows an unusual set-up on a Brown & Sharpe milling machine, using a universal head to swing the cutter arbor parallel with the table

Fig. 7—Rack and closet for tool storage. Milling machine and similar arbors are stored vertically, as shown in the steel rack at the left. The rack is built of steel plates that are supported and separated by the six bolts and nuts shown. A small addition has been made at the right. This rack keeps the arbors where they are easily accessible and at the same time safe from damage

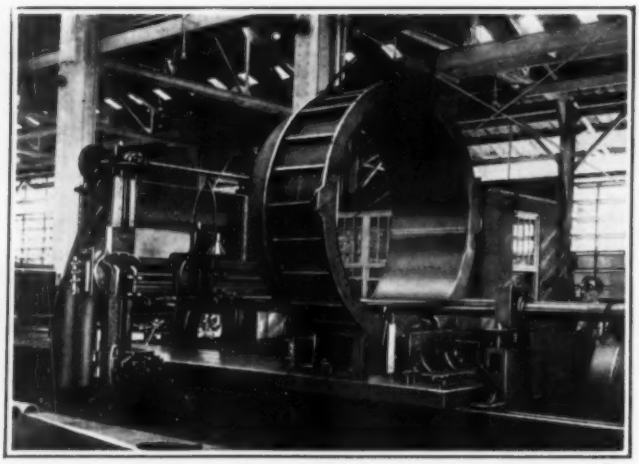


Fig. 8 — Planing taper seats in large valve casings. An ingenious method for planing valve casings to receive renewable seats in order to prolong the life of the valves and make renewals easy. A universal joint at the end of the bar where it is fastened to the toolblock, in connection with a spherical support at the outer end of the bar, makes it possible to feed the tool across the work and also to regulate the depth of cut, while at the same time having the cutting tool supported without overhang

vessel, while a railroad down the other side takes care of all kinds of supplies.

The administration of a plant of this kind is a real problem. The plant must be good in every particular. It must be well housed, have good machine equipment and be efficiently manned with men of experience. It must be ready to handle breakdowns in the shortest time possible and yet keep expenses down to the minimum. And, as the work varies between wide limits, this is no easy task.

No ship that can possibly get to its own base will lay up at the canal for repairs. Not so much because of a greater cost, but that its repair base needs the work to be efficient. And this applies to the navy as well as to private shipping concerns. For, while this is a government plant and the cost of repairs would all come out of the taxpayers anyhow, the navy feels that its own yards must be maintained and that the work should go to them if possible. This leaves the shops at Panama with only the work that cannot be longer delayed, except, of course, such work as is necessary for the maintenance of the canal itself.

In order to keep the shops employed between emergency repairs, they have been building the electric towing locomotives, or "mules," used in handling vessels in the locks. Fig. 2 shows the frame of a "mule," with a cab at each end, and Fig. 3, the driving mechanism for one end. The frames are of cast steel, made in the plant's own foundry, and are splendid examples of steel castings. The whole machine does credit to the men and the management. In addition to the driving mechanism shown in Fig. 3, there is a capstan, or windlass, on which the towing rope is wound and taken up or paid out as needed to suit the towing or holding of the vessel in the lock. The driving, or rack gears, are one diametral pitch. The "mules" have two speeds.

Building the "mules" has formed a basis for keeping the men employed and contented, but it is proposed to have all future towing machines built in the States. Regardless of the exact comparative cost of having the work done in Balboa, there are other factors to be considered. The plant must be maintained for emergency repairs to merchant vessels or to our own naval fleet. An adequate working force must be maintained at all times, since men cannot be taken on and laid off, as in thickly populated centers where jobs are plentiful. Then too, the morale of the men must be considered, since it is impossible to expect them to have a keen interest in their jobs when there are long, idle spells and when they see work that can be done in their shop, going elsewhere. Here is a plant that must be maintained for emergencies and in which the overhead may well be charged to national insurance, or to anything else that is a necessity in a modern business. It should not, of course, attempt to build standard commercial articles. But it should be kept as busy as possible in work that pertains to the canal, or to any public works in its own locality.

At the end of the World War the total force employed in the mechanical division amounted to about 3,200 men. With the slump that came in 1920, and thereafter, the force was gradually reduced to about 1,400, which is the number now employed. This reduction naturally called for a reduction in the overhead expenses of the establishment, and that this was well done is shown by the fact that for a reduction of each $100,000 on the direct labor roll, there was a corresponding reduction of $40,000 in the overhead expenses. This reduction may be compared with the corresponding one of $36,000 made under similar circumstances by one of the best-run ship yards in the United States. An advantage that resulted from the reduction is that it afforded an opportunity to pick out and retain the best men, so that now the average of skill and efficiency among the remaining mechanics is as high as will be found anywhere.

Some idea of the machine equipment and the variety of work encountered may be had from Fig. 4, in which two laying-out benches form the center. Here are more castings made in the plant's own foundry, and the equipment of squares and surface gages indicate that much of the work requires laying out. A pot of spanish whiting for coating the work to be laid out, hangs conveniently at the end of the large bench. There is also a small air hose to accelerate drying the coated surfaces. An electric connection on the center leg allows an electric drill or a small grinder to be used. The wooden-block floor is a favorite in the tropics.

Owing to the varied nature of the work handled, it is not always possible to take the work to the machine.

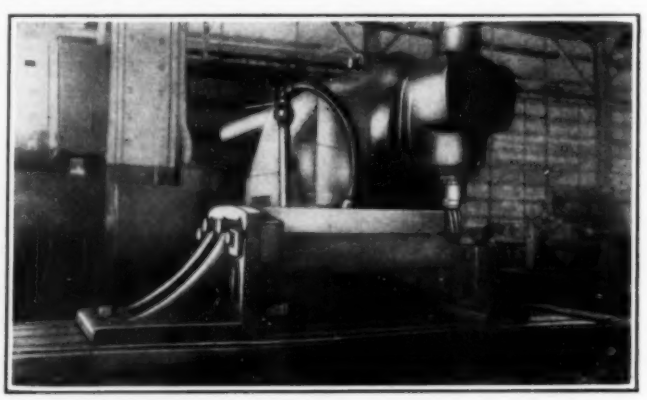


Fig. 9 — Milling valve guides for removable wear-piece. Another instance of improving the original design so as to permit easy renewals at overhaul periods. This instance is one of many where those in charge of maintenance have been able to improve on the original design of parts

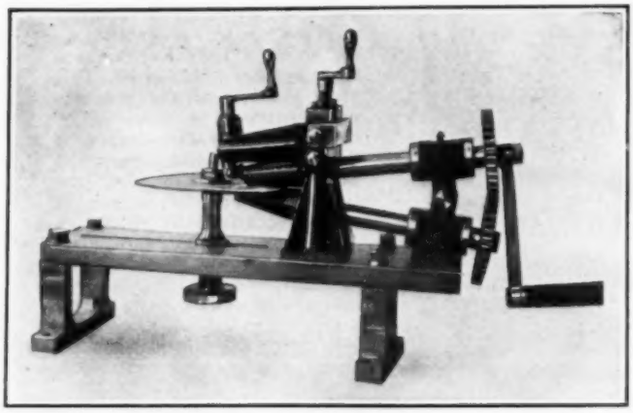


Fig. 10 — Machine for corrugating gaskets. One of the small devices that help to reduce maintenance costs. This machine will roll corrugations in gaskets of any required diameter, and is easily adjusted from one size to another. The corrugating rolls are driven by the tapered gears and can be adjusted as to contact by the handle shown

This is equally true in the use of the hydraulic press shown in Fig. 5. This press has a separate head with heavy ears into which the heavy T-headed side bars are placed. Suitable cross members can be placed at any point and are held by keys at various points. Pressure is applied by the small hand pump at the right. The supports are of heavy wooden blocking, and the whole apparatus can be carried to any part of the shop or yard as necessity requires.

A special milling job where racks having angular teeth are being cut on a Brown & Sharpe milling machine by means of a universal milling head, is shown in Fig. 6. The racks are part of the operating mechanisms of machinery on the canal locks. The spacing must be accurate in addition to having the angle right. The set-up on the milling-machine table has to be carefully planned, so as to permit all the teeth being cut without shifting the work. After the angle and the location have been determined, the chuck, or holder, remains in position on the table and the pieces are simply clamped in position by side screws. This job is a fair sample of the work that has to be handled in such a shop as this.

Neatness and order are evident on every hand in this shop, as indicated by the arbor rack and the closet for bolts, clamps, etc., in Fig. 7. Arbors are kept on end, where they can be readily seen and taken out as needed, and be kept from either dirt or damage. Wrenches are hung on the inner side of the steel door, while the closet itself holds blocking and bolts used in various kinds of set-ups. The closet is near the milling machines, so that no time is lost in finding the necessary equipment.

An unusual job is shown in Fig. 8, where tapered ways are being planed in a large valve casing to receive bronze wear shoes. This is another case where the original design did not provide for wear, and where the men on the job have lengthened the life of the apparatus by making provision for replacements in future. This example is one of many where intelligent interest and loyalty on the part of the men in the Canal Zone have reduced operating costs and saved real money for the taxpayers.

The piece shown in the Pond planer is the casing of one of the 7-ft. circular valves used in the lock culverts for controlling the water flow in filling the locks. The casing rests in an improvised cradle so that it can be readily adjusted to the proper position, and the cutting tool is held in the long bar shown attached to the tool head on the cross-rail. The bar has a universal joint next to the toolhead so as to permit it to be swung in any direction. The outer end is held in a ball joint to allow free movement as the tool head moves in one or the other direction.

The valve casing is located in the cradle at the proper angle and in position to give the desired taper. Then the bar carrying the tool is moved by means of the tool-head and saddle into position to cut the tapered recess. While the taper is secured by positioning the work, the universal joint allows the tool to be fed across the recess by moving the head on the rail, and the depth of cut is adjusted by the vertical motion of the toolslide. The ball-joint bearing permits the utmost freedom of adjustment.

Another unit that has been improved by the addition of wear plates, is one of the guides for the valve, to be seen in Fig. 8. The guides were originally made solid but are now milled off on the wearing faces, as shown in Fig. 9, and have wear plates put on after becoming worn in service. This method makes future repairs less expensive, both as to actual cost and in keeping the locks out of commission for a shorter period.

Corrugated copper gaskets are used largely in making joints in flanged pipe. In order to corrugate the gaskets easily and quickly, the little device shown in Fig. 10 has been designed and built at the Balboa Shops. It consists of a base that carries corrugating rolls and a central stud on which the gasket revolves. The stud can be moved to give any diameter within the range of the machine. The rolls are tapered and are driven by the gears near the crank. Pressure can be applied at both ends of the rolls, and so prevent spring when in operation. This device is one of the small conveniences that go to make the work of maintenance easier and less expensive.

The Cost of Attending Bid Openings
Discussion

By Ernest E. Laib

IN HIS article under the above title, on page 209, Vol. 68, of the *American Machinist*, John R. Godfrey concludes with the question "What do you think?" Price cutting as I see it, represents a secret reduction that is not founded on sound principles. For instance, discounts publicly published or circulated on catalog list-prices are certainly not classed as price cutting. When, however, salesman makes you a confidential offer on a particular inquiry of a direct reduction from an established price without any sound practical reason for so doing, that is price cutting pure and simple.

In the instance cited by Mr. Godfrey, the reasons given for the reduction in price were logical and obvious. They were based on the elimination of an expenditure that was not beneficial to either party, and represented a concession that was mutually advantageous. The machine manufacturer would obviously not have hesitated to offer the same inducements to any other prospect, for it was a fair and aboveboard offer, that was just as acceptable and profitable to him as if he had charged the full price and had to pay the expense of attending the bid opening. Such men are an asset rather than a liability to the industry of which they are a part.

A Bit of Aviation History

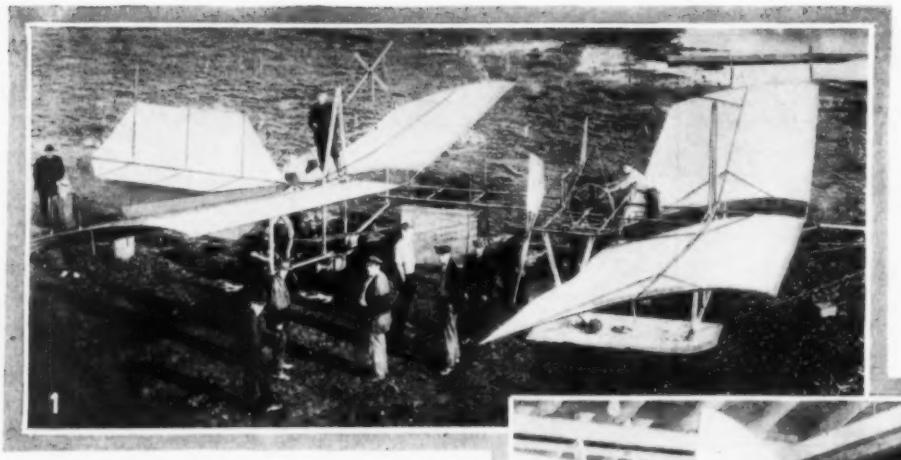


Fig. 1—The original Langley airplane being assembled on the Shore of Lake Keuka for a flight by Glenn H. Curtiss. This view shows how the pontoons were attached in order to fly the plane from the surface of the lake, and also shows the Langley motor that drove the two propellers by means of beveled gearing. It should be remembered that Mr. Curtiss actually flew this machine and proved that Prof. Langley's theory and design were correct

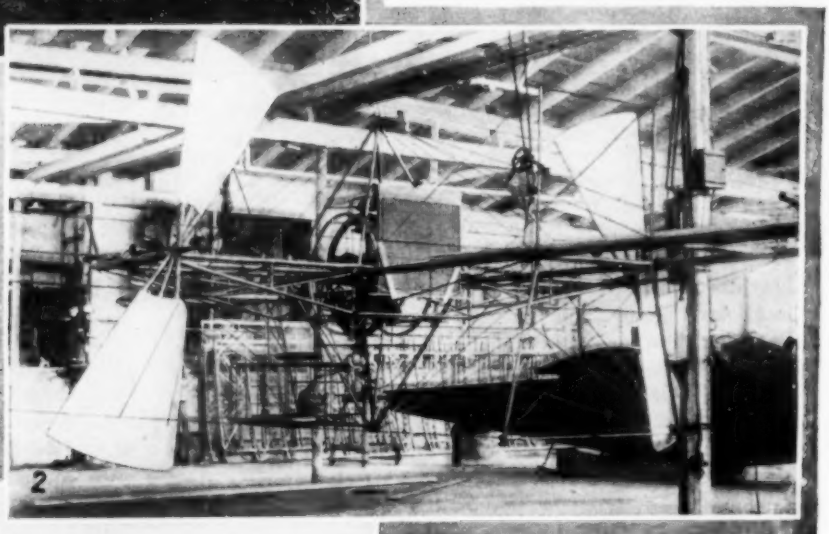


Fig. 2—The frame of the Langley machine in the Curtiss shop at Hammondsport. This view shows the canvas-covered propeller, the 5-cylinder, radial, water-cooled engine developed and built by Charles M. Manley especially for this machine. The manner of supporting the engine and propeller-driving mechanism on the trussed frame of steel tubing is of particular interest, in view of the recent developments in modern airplane fuselage construction

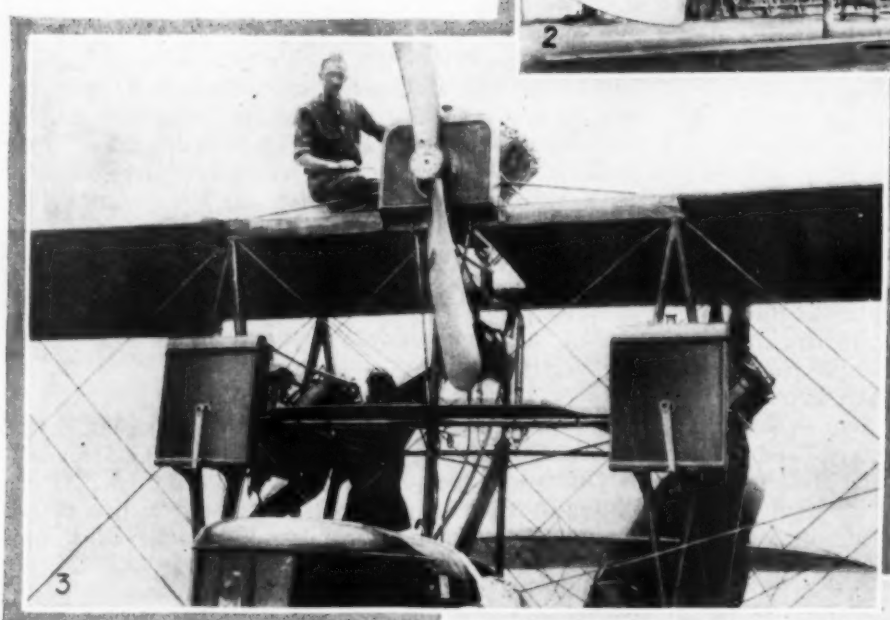


Fig. 3—The original attempt at a transatlantic flight. This plane is a portion of one of the two "Americas" built by Glenn H. Curtiss in 1914. Owing to the outbreak of the World War, the flight was never attempted

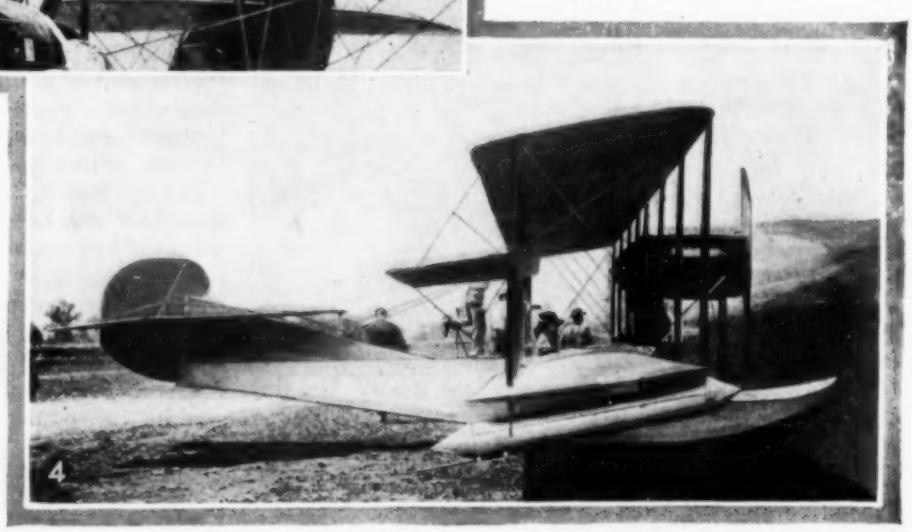


Fig. 4—The first flying boat with tractor propeller. This machine was built by Glenn H. Curtiss. The general outline of the hull, as well as the fuselage and wings, is of interest as compared with the later productions along this same line. The boat body carries four passengers

Details of Jigs and Fixtures

Design of Latches

By J. A. Potter

Uses and methods of application of latches to jigs and fixtures—Various types of latches and their points of advantage and adaptability

A LATCH can be used for locking a jig leaf or cover, and it can also be adapted to hold a part in position. By means of latches, also, parts can be positioned easily in jigs or fixtures, the forces being applied in either a direct or an indirect manner. Furthermore, a latch being compact and capable of being operated from around the corner, it is a means by which the jig or fixture can be kept from becoming bulky as may occur with clamps. When holding work, latches resemble clamps, particularly if they are actuated by a screw. Some of the latches described may be operated by either a tension spring, flat spring, compression spring or screw. The latch in Fig. 1 is the most simple and dependable for holding small leaves or covers in position. It is made from a sheet metal stamping, and has a cam shape on the under side of the short end. This latch is quick in its operation, and is not hard on the operator's fingers. It can be made either right- or left-hand, and the handle end can be bent as shown at *A* in order to clear in difficult places. A somewhat similar latch is shown in Fig. 2. This latch engages two milled notches in the wall of the jig, care being taken to give enough strength at *B*. The cam in this case is formed on the top of the latch. The handle is placed off center so that it will clear the wall of the jig when the cam is disengaged, and also have a better leverage position.

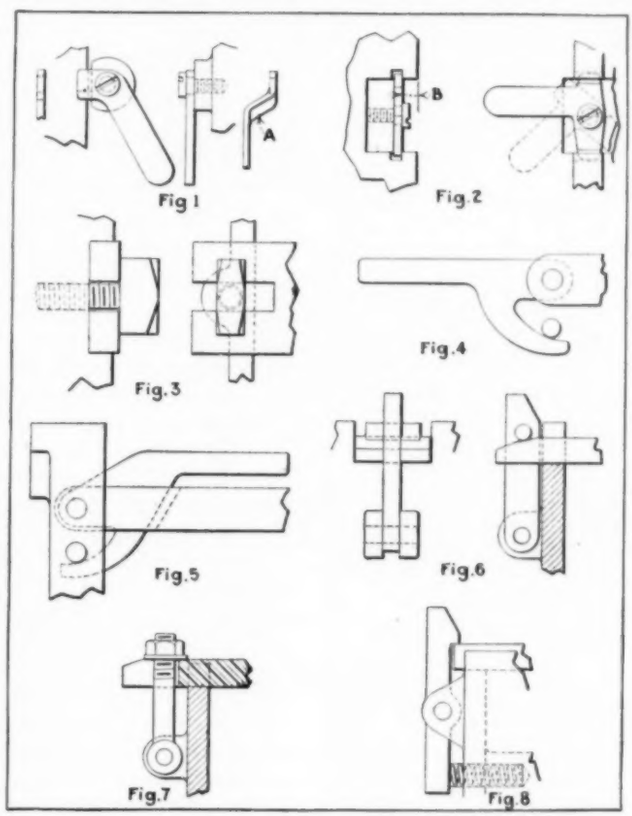


Fig. 1-2—Common types of latches. Fig. 3—Screw latch. Fig. 4-6—Cam latches. Fig. 7—Swinging screw latch. Fig. 8—Automatic spring latch

The quarter-turn screw shown in Fig. 3 should be mentioned here, although it is not strictly a latch. This screw is located in the slot of a cover by a quarter turn, releasing the cover so that it can be opened readily. This screw is usually placed in jigs having a cover through which a binding screw is operated, although in general it is better to design a jig so that the cover will be used for bushings only, as a clamping screw in the cover has a tendency to force the bushings out of alignment. The cam latch illustrated in Fig. 4 is quick operating, and is recommended for use on covers of the larger jigs and fixtures. A variation of this latch is shown in Fig. 5, with the offset on the handle, which makes it adaptable for certain types of jigs when feet are required on the latch side of the jig. Another type of cam latch is illustrated in Fig. 6. The body of this latch passes into a slot in the leaf, and the top side of the leaf is cam shaped. The pin in the latch forces the leaf down to its seat. The eyebolt latch is shown in Fig. 7. This latch can be operated by swinging it into the slot on the leaf, and can be fitted with a nut, wing nut, knob or handle. If used on chucking fixtures such as the lathe or internal grinding type, the seat of the nut should be counterbored below the surface, so that the latch will not swing out readily if loosened by centrifugal force. The end of the leaf is rounded to enable the latch to swing out without making more than two turns of the nut. In Fig. 8 is shown the old-fashioned spring latch which is sometimes found useful. When the leaf drops on the incline on the head of the latch, it forces it open, and is closed again by the spring when the leaf is in position.

A through pin is sometimes used in a leaf to form a method of latching. It is slow, but is one of the most positive methods if a clamp is to be operated from the cover. This pin latch is shown in Fig. 9. The latch shown in Fig. 10 is similar in principle to that in Fig. 2. This type is used on jigs where there is not much room for handle movement, particularly in small jigs. The head can be notched, scored or knurled.

The tenth article of the series. The eleventh will appear in an early issue.

In Fig. 11 is illustrated a direct latch for positioning and clamping work. This is clamped by a screw in a "dutchman," or stud. For positioning only, it can also be operated by a spring. In Fig. 12 this is shown.

When a shoulder screw is to act as the fulcrum of a latch, a cam, or similar mechanism that has to stand up under a clamping strain, the body of the screw should be made longer than the thickness of the part swinging on it, and the screw body should be supported in a counterbored recess at least one-third as deep as the diameter body of the screw. This is shown at *A*, Fig. 13.

Springs can be used on latches to keep them open for a loading position. An illustration of this is shown in Fig. 14. Sometimes the tail of a latch is made heavier than the body part, and the latch is thus kept open by gravity. This method eliminates the chip interference, which is likely to clog a spring. Two latches can be used to provide a wider opening for the removal of parts so that the binding screw will require only a part of a turn, instead of being revolved for the full length of thread. An example of this is shown in Fig. 15, in which the latch *A* swings back, allowing latch *B* to open to the outlined position. A latch that binds on the draft of a drop forging has a tendency to lift on the end. This is overcome by providing a block, or by using a shoulder screw, under which the head of the latch slides. In Fig. 16 this is shown.

The latch shown in Fig. 17 is used to locate work by an indirect force. This can be operated by various springs, or can be used as a clamp by the application of a screw as illustrated. In Fig. 18 is shown a clamping latch that will locate parts by applying a force in two directions. This latch works in a similar manner to an equalizer, and can be used with unequal legs to apply unequal forces, if desired. A dust-proof latch is shown in Fig. 19. This latch is rectangular in shape, and slides through a slot with a sheet-metal cover holding it down.

A spacing piece is one form of a latch often used in holding parts, so that they can be readily loaded and unloaded in fixtures. This spacing piece is usually fastened on one end, so that it can be swung out of position, and yet be attached to the fixture, although sometimes it may be a loose piece. An illustration of a spacing piece is shown in Fig. 29, the force being applied at a point where the part has a heavy wall.

Latches are often used as position stops for indexing, a common type of nose being shown at *A*, Fig. 21. A better nose for indexing is shown at *B*, in which one side is flat and placed on the radial center line. This is a much easier construction for the toolmaker. A latch operated by either a compression or tension spring is shown in Fig. 22. This type is also valuable in indexing, as a spring pin can be used under the outer arm, which acts as a handle. A latch or spacing piece under the tail of a clamp serves as a means by which a large opening at the nose of the clamp can be obtained without giving the binding screw more than a half turn. This is illustrated at Fig. 23, in which the latch is shown in position at *A* and pulled out at *B*. The different latches shown can be readily adapted for any size of jig or fixture, and can also be worked into different combinations for positioning and holding work.

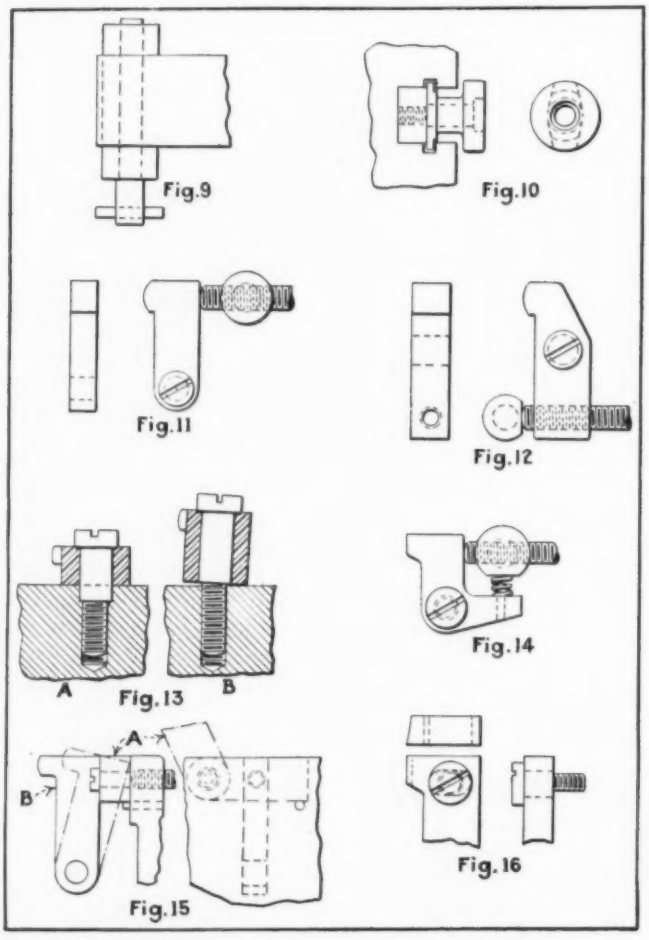


Fig. 9—Removable pin latch. Fig. 10—Cam latch with thumb knob. Fig. 11-12—Swivel latches. Fig. 13—Design of fulcrum pin for latches. Fig. 14—Swivel latch with spring release. Fig. 15—Double latch. Fig. 16—Latch end for holding forgings

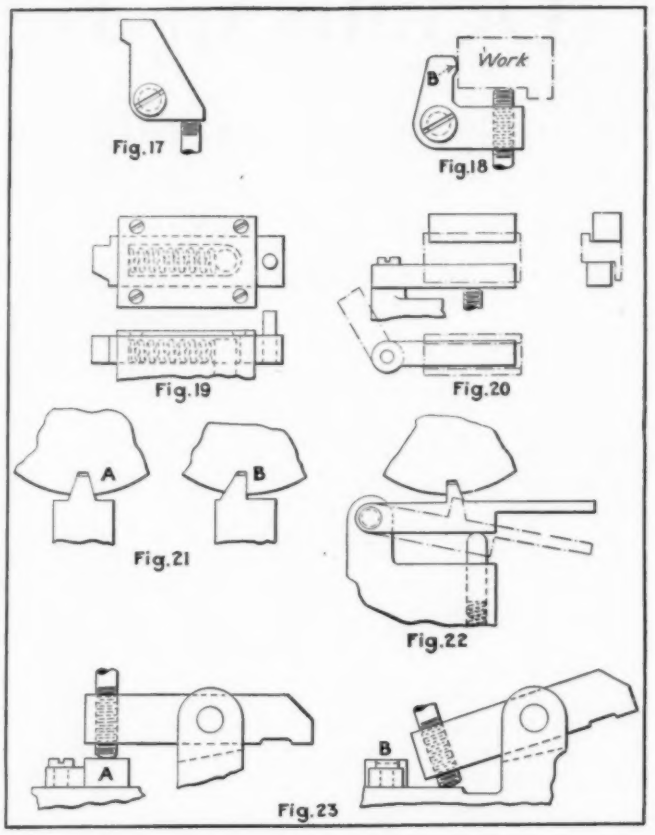
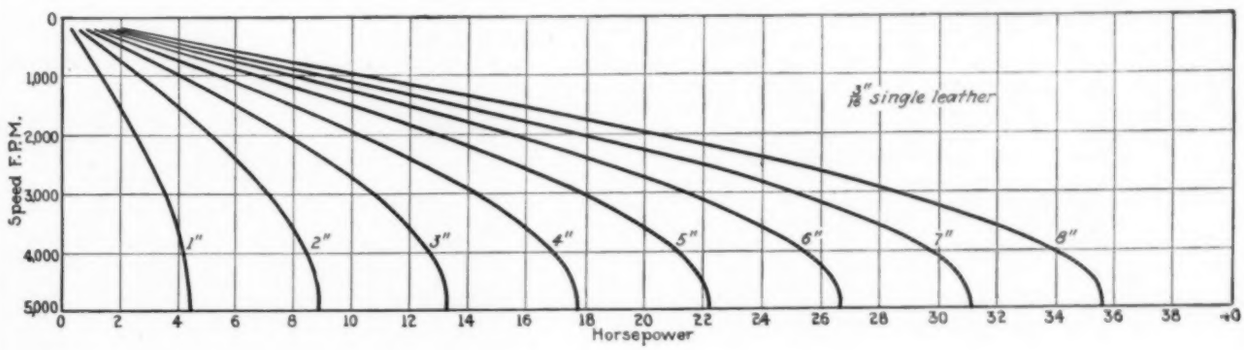


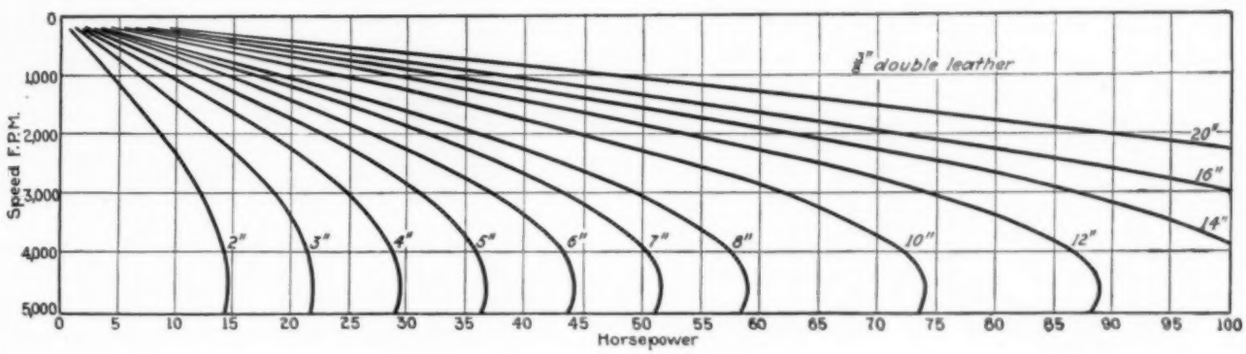
Fig. 17-19—Other types of latches. Fig. 20—Spacing piece for latch. Fig. 21-22—Latches for indexing. Fig. 23—Spacing piece for clamp end

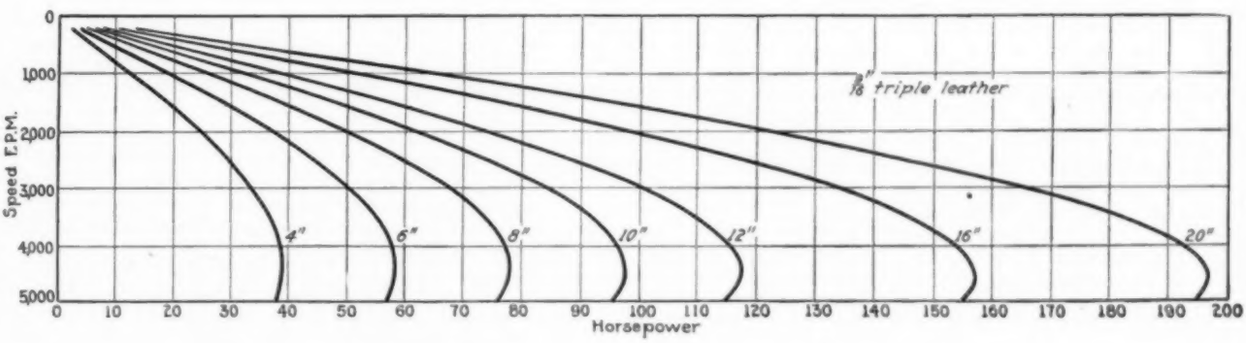
Power Transmitted by Leather Belts

The need for a quick and accurate means of estimating the size of belt required for a given installation led to the development of the accompanying charts by a company supplying belting to the machinery industries. There is nothing new in the original calculations for the belt sizes, and the figures for plotting the curves were originally obtained from standard belting formulas. But the charts have been used in service over a period of time, and have been so checked that they can be considered as thoroughly practical, and as giving good results under all average machine conditions. Each curve represents an even belt width. It will be noted that a given horsepower can be transmitted by a narrower belt by increasing the speed of travel. The curves are approximate straight lines until the higher speeds are attained, where the centrifugal force developed has a marked influence in decreasing the amount of power transmitted by the belt.

The charts are for use with leather belts only. Similar ones have been worked out for fabric belts, but the curves in this case, of course, will vary according to the nature of the fabric and the impregnating material. With the fabric belts tested it has been ascertained that the power transmitted at high speeds does not show the same dropping off due to centrifugal force, as in the case of leather belts.







Charts Contributed by W. W. Nichols, Vice President, D. P. Brown & Company

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· TECHNICAL · ABSTRACTS ·

A Study of the Requirements of Low-Temperature Lubrication

Effective year-round lubrication should be the ideal of everyone who has to do with the operation and maintenance of industrial plant machinery. The effect of low temperature upon lubricants will frequently be decidedly marked. Sluggish flow in the case of certain oils, actual congealing of others and practical solidification of greases may all be met with. As a rule the requirements of lubricating equipment and those properties of lubricating oils and greases which will influence their ability to function under low-temperature conditions must be studied and understood. It is not an impossibility to attain effective lubrication in cold weather; it is simply a more difficult problem, one that cannot be solved by "just buying oils and greases." As a rule there will be more failures in lubricating machinery at low temperatures, probably a greater amount of wear between the moving parts, and perhaps shutdowns for repair will be more frequent. Even with the most carefully selected lubricants this condition will hold true, because the human element is a factor that frequently cannot be absolutely controlled.

It is with exposed installations involving gears, chains and wire rope that the most difficulty will be met in cold weather. In the first place the lubricants to meet the average friction-reducing requirements of such equipment must be of comparatively high viscosity, in fact considerably higher than that required for bath or circulating systems of lubrication. The heavy body of such a lubricant will render the retention of contaminating foreign matters more probable. So where dust, dirt, ice or abrasive metallic articles may be encountered it is reasonable to presume that the resultant contamination of the lubricant will lead to a greater degree of wear on gear teeth, chain links and the strands of wire rope. The lower the operating temperature the more apt will this be to occur for dirt accumulations will be harder and the lubricants will frequently not form as perfect a protecting film on the wearing elements.

The ability of an oil to function effectively can frequently be tested roughly by exposing a sample bottle of the product to the prevailing temperatures of operation. This test can be developed into a rough measure of the pour test if the temperature of approximate congealment is noted, provided it is as cold as that. A more positive test, however, is to expose a sample of oil to gradually lowered temperatures, noting the degree of sluggishness at 5-deg. intervals. When oil ceases to drop from a thermometer as it is withdrawn from the oil the temperature observed can be taken as being approximately that of the pour test. Although the pour test may be regarded as a measure of the relative degree of sluggishness of an oil, the viscosity will be a measure of relative fluidity. Viscosity involving the internal or fluid friction will vary inversely with temperature, that is the lower the temperature, the higher the viscosity.—Allen F. Brewer. *Industrial Engineering*, January.

Progress in Hardening High-Speed Steel

Each passing year sees a narrowing down of the variables that cause failures in hardening high-speed steel. Progress is being made both in the equipment for handling the steel through the hardening process and in the understanding of important fundamental principles. No new discovery seems to be imminent, but there is a tendency to furnish steels with slightly higher carbon and vanadium content, which seems to be an improvement. Some of the new types of steels run as much as 5 to 10 per cent ahead of the standard type in cutting efficiency.

Notwithstanding the improvements in steels, the fact must not be overlooked that no high-speed steel is better than its heat treatment. Proper consideration should be given to the selection of fuels, to the arrangement of furnaces, to accurate and reliable instruments for the registration and control of temperatures, and to the means and methods of quenching. It should always be borne in mind that neither the steel maker nor the tool hardener can be expected to carry the entire burden of responsibility for the success or failure of high-speed steels.—R. M. Sandberg, *Fuels and Furnaces*, January.

Abuse of Air Tools

The greatest damage done to the working parts of air tools may be found in the compressor, or rather in the air delivered by the compressor, for not by any means do all users of air tools appreciate the actual necessity of clean, dry air. Until the advent of the air filter, dirty, gritty, moist air had been the cause of thousands upon thousands of dollars being spent in needless repairs on air tools, and on the compressor itself, especially that of the portable type. Besides seeing that clean air is delivered by the compressor, care should also be taken to keep dirt out of the hose and leaders. Open hose ends are often allowed to lay on dusty, dirty and even sand-covered floors, and then be hooked up to motors and guns without a thought of the necessity for blowing out before connecting.

Motor and gun valves require regular inspection in order that impending trouble may be caught in time, but with clean air and regular, systematic oiling with the right kind of oil, the time needed for inspection can be reduced greatly. Of course, the utilization of a known, valued oil is a positive requirement. An oil of good quality will remain for some time in the valves and around the plunger of a riveting or a chipping gun, and guns with the right kind of oil have been known to work perfectly when oiled once in three hours of continual service.

Air tools are expensive, and their abuse is costly. It seems unbelievable that so little interest is taken in their care by the persons most interested in the returns that might be expected from their use. Whether tools are properly cared for or abused is largely a matter of foremanship, although this fact seems to be generally overlooked. — J. D. Claghorn, *Compressed Air Magazine*, February.

The Disk Grinder in Automobile Manufacture

One reason why disk grinding is an economical means of finishing many flat surfaces that heretofore have been planed or milled is that a smaller allowance may be made on pieces designed with that means in view, thus not only lowering the grinding time but saving in the aggregate a not inconsiderable amount of material as well.

To finish flat surfaces on large parts the horizontal type of machine with a large disk is recommended. The semi-automatic machines of this type that are equipped with fixtures to locate the work and bring it into grinding position are productive of excellent results. Small work is usually ground on vertical machines having lever-feed tables.

In selecting work to be disk ground the following points should be kept in mind: the amount of stock to be removed; the distribution of the ground surface; the total area to be ground; and the capacity of the adjacent surfaces to absorb the heat of grinding. By exercising proper care in design, production may be materially expedited.

To forestall generation of heat to the greatest possible degree the abrasive circle should be sharp and free-cutting at all times. The coarsest grain practicable should be employed and sufficient feeding pressures maintained to make the disk cut freely.

No general rule can be cited to follow absolutely in the selection of disks for grinding. Carbide of silicon usually gives the best results with cast iron and brass, and aluminum oxide with steel. Garnet is ideal for wood-working, and emery is much used to grind non-ferrous materials. — *Abrasive Industry*, February.

IDEAS · FROM · PRACTICAL · MEN

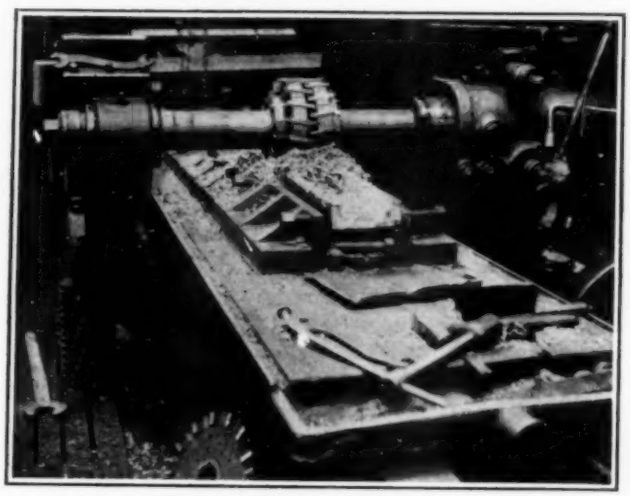
The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit

Fixture for Holding Crosshead Shoes

By Milton Wright

The fixture shown in the illustration herewith holds three crosshead shoes to be machined. It consists of a cast-iron baseplate having a tongue on the underside to match the T-slot of the machine table and two vertically projecting ribs, strongly buttressed on the outside to resist the pressure of the work-holding screws, running lengthwise of the base to form a channel between them wide enough to admit the work. Setscrews passing through the ribs near the upper edges provide means to secure the work in the fixture.

A pair of interlocking inserted-tooth milling cutters may be adjusted to mill any desired width of channel



Milling crosshead shoes

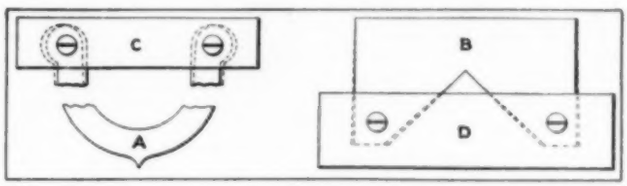
within their capacity, milling the sides of the channel at the same time. Smaller cutters of the same type, one on each side of the pair of large cutters, mill the edges. The work is done on an Ingersoll milling machine and is completed in one pass.

Preventing Distortion in Hardening

By Charles Kugler

The punch *A* and the die *B* were made of oil-hardening steel, and in spite of all methods of heating—from electric furnace to packing in boxes filled with charcoal—they were found to be distorted, as shown by the dotted lines, when taken from the quenching bath.

After the punch and die were annealed and bent back to shape, clamps *C* and *D*, respectively, were attached by screws, the clamps remaining in place during the heating and quenching operations. When removed from the quenching bath, the clamps were taken off and it was found that no distortion had taken place.



Clamps to prevent distortion in hardening

The screw holes did not interfere in any way with the use of either the punch or the die.

Self-Locating Drill Jig

By I. B. Rich

In building up a small structure from beams made up of light sections it was necessary to drill for one rivet in each joint. For best results this rivet hole had to be in the center of the joint and laying out each hole was a tedious job.

In order to do this work quickly and accurately, and without laying out, one of the men devised and built the small drill jig shown herewith. It is extremely simple and effective, saves all laying out of the hole and centers it accurately no matter what the angle of the two pieces.

As can be seen in Fig. 1 it consists of two arms, each

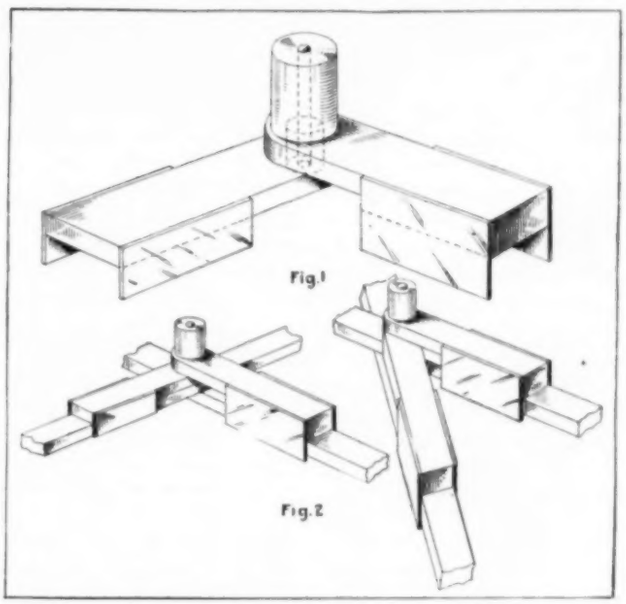


Fig. 1—Self locating drill jig. Fig. 2—How the jig is used at various angles

with a guide long enough to locate it accurately on one of the members of the structure. These two arms are joined by a drill bushing that fits a hole bored in line with their centers, the bushing acting as a pivot on which the arms swing.

This construction automatically locates the hole in the center of each member, regardless of the angle, as can be seen from the applications in Fig. 2. This method should find numerous applications in other work where it is necessary to center holes as in this case.

Welded Steel vs. Cast-Iron Jigs *Discussion*

By A. F. Davis
Vice-President, Lincoln Electric Company

In discussing the article under the title given above, published on page 29, Vol. 68, of the *American Machinist*, John Woffington makes the erroneous statement that "Cast iron is more rigid than steel."

If Mr. Woffington will refer to any mechanical engineers' handbook he will find that the modulus of elasticity of cast iron is from 12 to 14 million, whereas the modulus of elasticity of steel is from 28 to 30 million. Therefore for the same weight and shape, steel is from two to two and one-half times as stiff or rigid as cast iron.

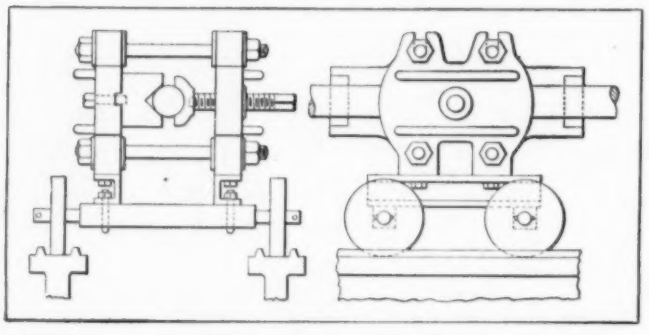
I believe Mr. Woffington's reasoning in the latter part of his discussion is also fallacious. He states that cast iron would break, showing that it had been injured, where steel would only be bent. If this same line of reasoning were followed out, we would be building our skyscrapers, bridges, machinery, etc., out of cast iron. Whereas we know that such practice would be ridiculous and there is no question but that steel is by far the better material.

A Shaft-Straightening Fixture for Large Lathes—*Discussion*

By George W. Clarke

The shaft-straightening fixture described by H. L. Wheeler, on page 863, Vol. 67, of the *American Machinist*, reminds me of one that I made several years ago. While it is similar in many respects to the one described by Mr. Wheeler, it has some features that I think are superior.

My straightener, as shown in the illustration, is so mounted on the lathe that the screw is horizontal, making it more convenient to operate. The screw and the V-blocks are always at the center height of the lathe, so that it is not necessary to remove the shaft from the centers, except to take it out of the lathe after it has been straightened. The two upper bolts lie in slotted holes in both plates and they can readily be removed for placing or taking out the shaft.



A portable straightening press

The axles are shouldered back far enough to allow the straightener to be moved so that the V-blocks will clear the shaft while it is being run by power to mark the high spots, or so that they will accommodate shafts of different diameters. The screw is operated by a 4-ft. ratchet wrench. Sometimes it is necessary to put an 8-ft. length of pipe on the wrench and employ six men to turn the screw.

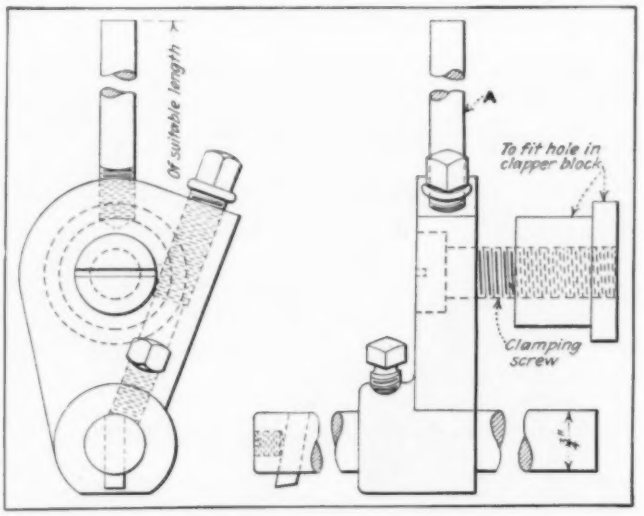
This straightener is made very heavy and is not used on shafts less than $3\frac{7}{16}$ in. in diameter. For smaller shafts we use a simple, home-made screw jack between the lathe bed and the shaft. For straightening shafts less than 2 in. in diameter, we use a lever.

A Splining Tool for the Shaper

By Ben West

The tool shown in the illustration has proved very convenient for use in the shaper for cutting keyways in pulleys, gears, etc., or for planing surfaces that would not be accessible with ordinary tools.

In planing hard material or material having hard spots that would tend to make the tool lift, it can be held to its cut by the hand, or a suitable push-spring can be



A useful tool for the shaper

placed between the tension bar *A* and the slide on the ram head, though ordinarily no such device will be necessary. The bar carrying the toolbit can be adjusted in the holder to suit the work. The holder should be case-hardened.

Welding a Cracked Locomotive Cylinder

By I. B. Rich

I saw an unusual welding job the other day in a large locomotive repair shop. The crack ran from the center cylinder of a 3-cylinder locomotive to one of the frame seats at the side, which is not uncommon. It was welded without removing the cylinder saddle from the locomotive.

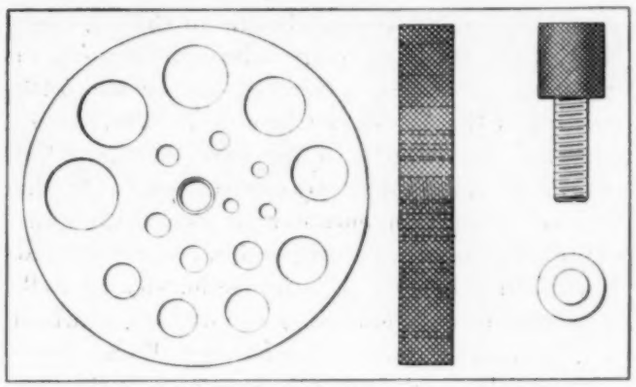
Pre-heating was done by putting in a piece of heavy front end screen in each side cylinder and in each valve chamber. The screen was cut wide enough to hold it about a third of the cylinder or chamber diameter from

the bottom so that it formed a grate for the charcoal used in heating. Burning charcoal in each of these grates warmed up the whole saddle sufficiently for the welding and distributed the heat through the whole saddle casting so as to avoid uneven shrinkage after welding.

A Holder for Use in Drilling Thin Metal

By E. L. Sleppy

In drilling tin and thin sheet metal, the holes are generally ragged and have large burrs on the under side. To avoid these troubles, I have made a pair of steel washers 2½ in. in diameter and ⅜ in. thick, and drilled a number of holes in them from ½ in. down. The washers,



One of the washers and the screw

one of which is shown in the illustration, were knurled on the edges and casehardened. The center hole in one washer was tapped, while the corresponding hole in the other one was a clearance hole. A knurled-headed screw, and dowel pins fitted to two of the mating holes to keep the holes in alignment, complete the device.

In drilling pieces of thin stock, the work is clamped between the washers and the holes are used as guides for the drill. Holes drilled in work held in this device are round and clean, with very small burrs on the under side.

An Expansible Dam for Casting Wear Plates

By Robert White

Railroads employ different methods of providing a wearing surface on the outer faces of driving boxes for locomotives where the boxes bear against the hubs of the driving wheels. Some roads attach a separately machined plate of brass or bronze with flush-head screws of the same material, others cast the crown brass into the box with a wide flange cast integral with it, and still others cast the flange separately after the crown brass has been machined and forced into the box under a hydraulic press.

At the Billerica shops of the Boston & Maine Railroad the latter method is practiced, and there is a very complete outfit for the work. After the machined crown brass has been forced into place it is heated with a kerosene blow-torch until it is nearly red hot. It is then placed on a small iron-bodied truck and is prepared as shown in Fig. 1 to receive the cast. The adjustable dam to be seen separately in Fig. 2 is placed in the open side of the box where it is expanded to fill the space therein tightly.

Fig. 1—A driving box prepared to cast the wear plate

Fig. 2—An expansible dam to fill the open end of the box

This handy little device consists of two parallel plates of steel, with an angle piece welded to each to stiffen it and to provide a place to attach the levers and screw by which it is held together and expanded. To one of the angles is bolted a cast-iron plate with two posts, or pedestals, in which a right- and left-hand screw takes its bearings. The other angle is slotted, and is joined to its mate by studs that confine the movement of the two parts to a single direction, to and from each other.

Two toggle levers are pivoted at one end on a single stud secured in one of the angles, and at the other end of each lever is a nut to travel on the right- and left-hand screws, respectively. It will be obvious that a rotative movement of the handwheel on the end of the screw will cause the parallel sides of the device to move together or apart, and thus adjust it to any width desired. Its range of movement is sufficient to cover all of the driving boxes in common use.

American Machinist

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Established 1877

On Cutting Prices

BUYER'S markets have recurred periodically since the time when the law of supply and demand first started to operate, and at each recurrence the seller has howled lustily at the squeezing that has been his lot. Tradition has so accustomed us to the sad fate of the seller in a buyer's market, or of the buyer in a seller's market for that matter, that we have grown a bit calloused and cynical. But should we continue in the path of tradition or should we recognize the greatly increased complication of the relations between buyer and seller in industry and take steps to eliminate, or at least alleviate, the hardships of the under dog in the present fight?

An investigation of the actual situation has been made and its results given in an article on another page. The remedies suggested go only part way in solving the problem, but even so they will seem very drastic to some of the parties concerned. It will pay all of us to consider those remedies carefully and see if we cannot propose better ones if they seem unacceptable. Later articles on the same subject will be just as good as the thought from the industry permits for they will be based on comments from the field.

Paying for Money-Saving Devices

LUBRICATION of machinery has long been a topic for animated discussion. Many have contended, and probably with perfect justification, that improper or insufficient lubrication was responsible for the majority of repairs in the average machine shop. As a result we have graduated from the squirt-can method in most cases and now have a variety of splash, force-feed and cascade or flood methods of performing this important function.

Some users have gone to considerable trouble and expense to install additional lubricating equipment, one manufacturer having spent an average of $200 per machine for a certain group that was vital in the scheme of production. The user pointed out to the builder that this equipment should have been part of the original equipment of the machine, but balked at the suggestion that the cost of the oiling system would have to be added to the price of the machine.

It is difficult to see why, if the additional cost was a profitable investment for the user, he should not be as willing to pay it to the builder of the machine as to anyone else. Builders of machines have no magic wand that produces $200 oiling systems out of thin air. Such details cost real money and must be paid for by those who reap the benefit of their use.

Chemistry As An Aid to Industry

CHEMISTRY'S contribution to the advances of the world of today is brought forcibly to mind by the papers presented before the 74th meeting of the American Chemical Society. These papers relate largely to the part chemistry has played in automotive transportation. Of the eighteen papers in question all deal with some phase of automotive work, and in some degree at least with a number of other industries as well.

Discussions of metallurgy and motors, to which may be added papers on nonferrous alloys, aluminum and electroplating, give some idea of the possibilities in these and similar fields. Rubber, glass, leather, coated textiles and automobile finishes form another group that is not confined to automotive fields. Similarly, abrasives and grinding, insulation, lubricants and synthetic resins were shown to depend largely on the work of the chemist.

Since all of these things directly affect the construction of many kinds of machines, it seems clear that all industries must utilize the chemist more than has been done in the past. He is the man who can help to solve problems that are outside the realm of the engineers who deal only with materials as they find them.

Keeping Interest in Safety

IT IS reported that at a regular safety meeting in a large car-building plant in the Middle West one of the workmen got up and remarked, "Boys, we haven't had an accident for more than a year, and if somebody isn't hurt pretty darned soon, maybe the boss won't let us hold these meetings."

That may sound ridiculous at first, but behind it is a plain matter of common sense. The shop needs constant incentive to keep up interest when figure comparisons begin to show no differences from month to month. When the shop hasn't had an accident in a year, interest may wane, and carelessness may crop up again.

Cincinnati-Acme Bottle-Mold Turret Lathe

CINCINNATI - ACME turret lathes equipped with special chucks and tooling for machining bottle molds and blanks are being introduced by the Acme Machine Tool Company, 4955 Spring Grove Ave., Cincinnati, Ohio. These machines turn the body of the blank or mold, face, back face, counterbore and bore the cavities in two operations. As shown by the illustrations the special chuck allows the mold to be positioned for machining successively the cavities in two- or three-bottle molds. Counterweights are provided to compensate for overbalancing when the mold is positioned off-center in the chuck. Forming is accomplished by means of a boring tool carried in a holder that moves vertically in a slide, the whole being mounted on the top of the turret parallel to one face. The path of the boring tool is controlled by means of a formed guide bar. Tool head, slide and former bar when considered as a unit are called a profiling attachment.

Prior to the turret lathe operations the matching surfaces and one end of a pair of mold castings are disk-ground, the locating lugs are milled, and the halves are drilled and pinned. For the first turret lathe operation the castings are mounted concentrically in the fixture with the locating lugs bearing on the finished surfaces of two rails. One portion of the mold is clamped to the rails and the two portions of the mold are clamped together. This arrangement is followed whether the mold has single, double, or triple cavity.

Using both the square-turret and the flat-turret tooling, the necessary concentric turning is done, the neck end is faced and back-faced, and the concentric counterboring is done. The mold and counterweights are then adjusted for off-center boring, and, for the successive cavities, the neck-ring seats are counterbored and the neck openings are machined. The square-turret tools are used for the counterboring and the profiling attachment for boring the neck-opening. These details complete the first chucking.

Using the same master fixture, but with a different work-holding slide, and locating the castings from the neck-ring seats, the body openings are machined in the second chucking, the number of indexings depending upon the number of cavities The profiling attachment is used to guide the boring tool. No finish-turning of the outside of molds is required, but blanks do require such an operation, which is performed by using the tools in the square turret. In Fig. 1, this turret can be seen.

To insure rigidity and accuracy a pilot bar is provided. It is secured in the profiling attachment and has a sliding bearing in the headstock. It is withdrawn prior to indexing the flat turret. There is no connection of pilot bar to profiling bar. The profiling bar is held to the headstock by hinge connections and can be thrown back over the headstock when indexing and when not in use.

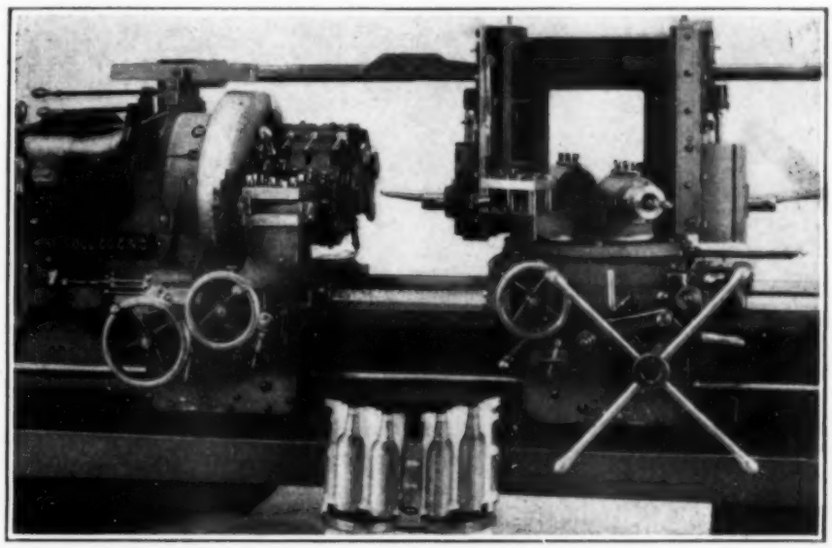


Fig. 1—Cincinnati-Acme Bottle-Mold Turret Lathe

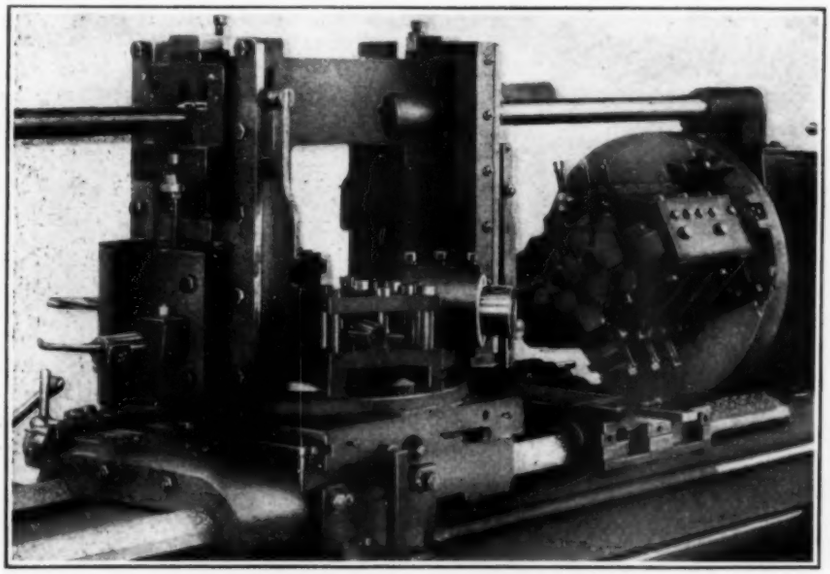


Fig. 2—Rear of profiling attachment, tooling, and chuck

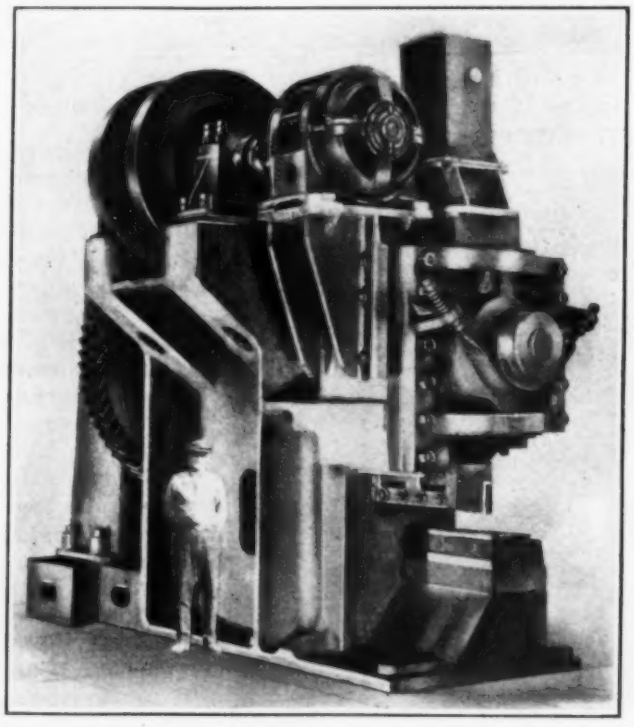
Mackintosh-Hemphill Open-Throat Shear

AN IMPROVED type of open-throat shear of large capacity, capable of cutting cold alloy steel 4½ in. square or 5 in. round, was recently designed and built by the Mackintosh-Hemphill Company, Pittsburgh, Pa. This shear weighs about 225,000 lb., and has a knife pressure of 1,400,000 lb. The weight of the shear frame alone is over 40 tons, while the total height of the machine is about 16 ft. The shear has a stroke of 6½ in. and is designed to make about fifteen cuts per minute.

It is operated by a 125-hp. motor, located on top of the shear frame. The drive gears are also mounted on top of the shear. This construction provides more floor space around the shear and keeps the motor and drive out of the way.

All gears, including the master gear and pinion, have herringbone cut teeth with a solid apex. The motor pinion and motor gear shaft are provided with ring-oiled bearings having babbitt-lined shells fitted in steel bearing bases which are rigidly keyed and bolted to the shear frame. The flywheels, as well as all gears, are inclosed in oil-tight covers. The pinion shaft is provided with two 63-in. flywheels spaced symmetrically on the shaft so that the load on the motor shaft is equalized. The eccentric shaft is provided with a square end on which the loose clutch slides. This shaft is supported in two bearings on the shear frame and by an outboard bearing at the clutch end and also another bearing in the faceplate. The eccentric carries a solid bronze slide mounted on a top ram. Bronze liners are also placed between the ram and the shear frame, and the front side of the ram is equipped with an adjustable wedge for taking up any wear in the ram. The shear is operated through an air-operated jaw clutch, also mounted on the top of the frame.

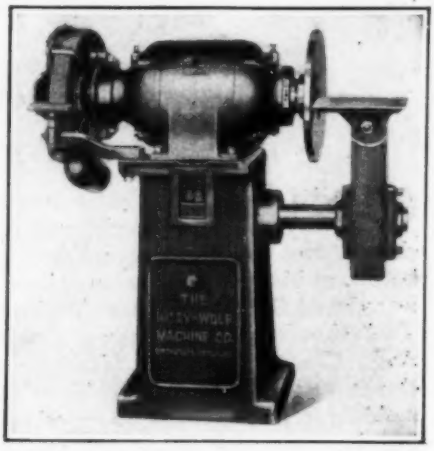
The top knife block is balanced with a double spring at the top of the shear. This spring is easily accessible for adjustment or replacement. To insure the stopping of the top knife block in the upper position, a band brake is provided at the end of the eccentric shaft that automatically comes into action as the ram reaches the top of its stroke and goes out of action when the material is being cut.



Mackintosh-Hemphill Open-Throat Shear of Large Size

"Hisey" Combination Disk and Floor-Stand Grinder

A 3½-hp. combination disk and floor-stand grinder was recently developed by the Hisey-Wolf Machine Company, Cincinnati, Ohio. The unit is designed to carry a grinding wheel 14 in. in diameter by 2½ in. face at one end of the spindle and a disk grinder 15 in. in diameter at the other. A plain work table 8¼ x 9½ in. is furnished as standard equipment for the disk end, but a universal lever feed table 6½ x 13 in. can be supplied to special order.



Hisey Combination Disk and Floor Stand Grinder

Regular equipment also includes a combination wheel guard and an automatic safety motor starter with suitable connecting wires. Grinding wheels are furnished to order only.

The spindle is made of special alloy steel of heavy proportions to insure permanent concentricity of the disk. It is mounted on high-grade annular ball bearings, which take radial load only. A double acting, self-aligning thrust bearing is provided to take all end thrust.

The unit is regularly provided for use on 220- and 440-volt, 3-phase, 60-cycle alternating current, or 115- and 230-volt direct current. The standard speed is 1,725 r.p.m. The machine can also be furnished to special order for 2-phase, 50-, 40- and 25-cycle circuits, and for special voltages from 110 to 550 volts. They can also be supplied for single-phase service with an improved type of repulsion-induction motor.

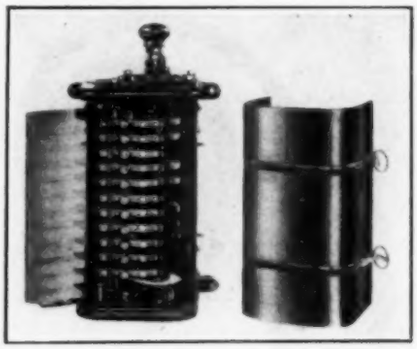
General Electric Drum Switches

Three drum switches are announced by the General Electric Company, Schenectady, N. Y., for use with squirrel-cage and slip-ring motors. They have been designed particularly for the control of small cranes, hoists, and machine tools, but can be applied on any work where a small and inexpensive drum switch is desired for the control of motors.

The CR-3200-1250-A switch is a primary-resistance drum switch for squirrel-cage motors, and has four points forward and four points reverse. It is suitable for motors that do not have an overhauling load; on hoists, for example, this switch can be used where worm gearing or automatic mechanical load brakes are employed.

Switch CR-3200-1250-B is a primary-resistance switch for squirrel-cage motors, and provides four points forward and one point reverse. This switch is suitable where there is an overhauling load. In such cases one point reverse is provided so that the motor will exert sufficient torque to prevent excessive motor speeds when overhauled by the load.

Switch CR-3202-1308-A is a primary and secondary reversing switch for slip-ring motors. It has five points forward and five points reverse and is suitable for starting duty or speed-regulating duty and can be used with 220- 440- and 550-volt motors, rated at 15 horsepower and less. All three switches have the same frames, but the cylinder developments are different. Horizontal handle, vertical handle, and rope wheel and spring return attachment are interchangeable on these switches.



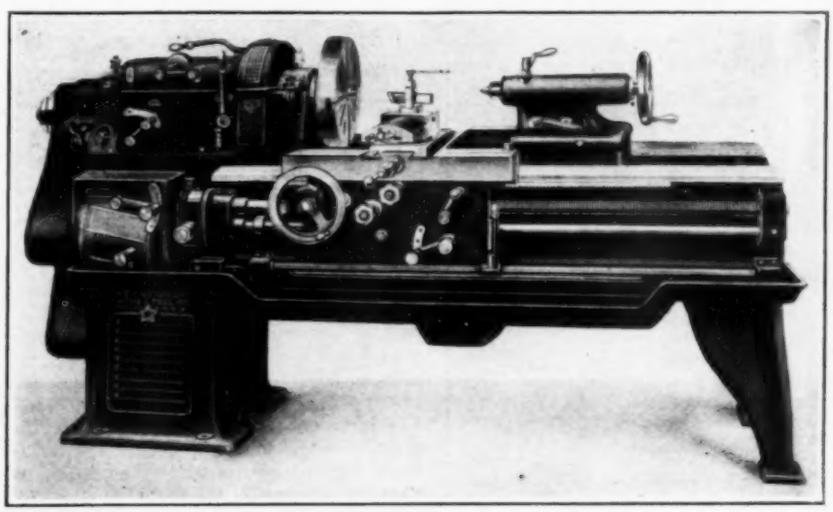
General Electric Type CR-3202-1308-A Drum Switch with Horizontal Handle

Cincinnati Improved Geared-Head Lathes

A LINE of improved geared-head lathes with the motor mounted in the cabinet leg under the head, is announced by the Cincinnati Lathe & Tool Company, Oakley, Cincinnati, Ohio. Any size and type of a.c. or d.c. motor can be accommodated inside the leg and either silent chain or belt drive is possible. The lathes are regularly furnished in the 16-, 18- and 20-in. sizes in 2-ft. bed lengths.

The lathes feature this company's patented quick-change gear box, providing a large range of threads and feeds. Twelve spindle speeds are instantly available. All of the gears and shafts in the head are made of manganese-chrome alloy steel, heat-treated and ground. The gear teeth are cut with special cutters to prevent gear marks appearing on the work. A locking plunger is provided to hold the spindle while removing chucks and faceplates without strain on the shafts or the gear teeth.

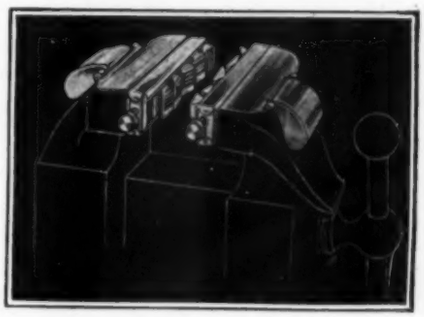
The clutch is of the compression-disk type and is of ample size to transmit the full power of the motor to the work. An index plate on front of the head shows the lever position for each spindle speed. These lathes are supplied either with or without oil pans, such as the one shown in the illustration.



Cincinnati Improved Geared-Head Lathes

"Universal" Vise-Grips

Odd-shaped pieces can be held in a vise with the "Universal" vise-grips marketed by the United Hardware and Tool Corporation, 74 Reade St., New York, N. Y. The vise-grips consist of a pair of detachable compensating jaws that can be used in any vise to hold any shape. They are placed in the regular vise jaws and accommodate themselves to the shape being held. The shape may be round, square, curved, angular, or tapered, and it is claimed that there is no danger of marring or jamming the lightest or heaviest piece held.



"Universal" Vise-Grips

The vise-grips are made of hardened and polished steel, and will stand any pressure the vise will stand. They are fully guaranteed by the manufacturer. The grips are made in two sizes, No. 4 and No. 5, to take care of vises ranging from 3 to 6 inches.

Milburn Type K-Jr. Touch-Up Gun

For general use where a fine paint spray is required, the Alexander Milburn Company, Baltimore, Md. has added to its line the Type K-Jr. touch-up gun shown in the illustration. The fine mist or spray produced by this gun is desirable for decorating, shading, high-lighting and blending of colors on any surface, touching-up scratches, mars or dents in automobile bodies and machinery, and numerous other fine painting operations using lacquer or paint.

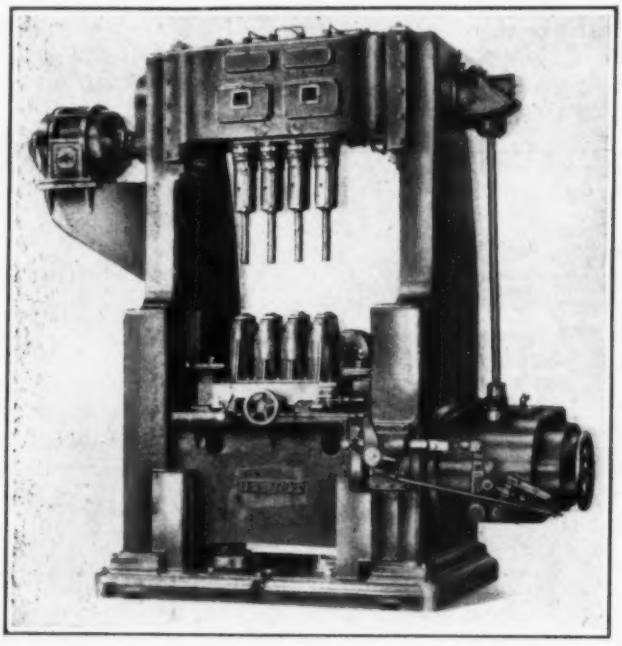
The liquid is completely atomized, and the gun can be adjusted to secure a fine hair-line spray for certain types of work. The same features incorporated in the company's standard type E gun are found in the K-Jr. gun. With a multiple head it is possible to obtain a flat horizontal or vertical spray or a round spray, controlled by a light pressure on the trigger. The construction is rugged throughout and is designed for easy cleaning. The gun will operate with a ¼-hp. air compressor.

Furnished with the gun are 6-ft. of air hose with connections. Various containers of either aluminum or glass, can be furnished with air-tight caps so that various color paints can be kept in condition while in the cup. Aluminum cups are 8 oz. in size, while the glass containers are supplied in 8,- 16- and 32-oz. sizes.

Milburn Type K-Jr. Touch-Up Gun

Defiance Extra-Heavy No. 8 Four-Spindle Cylinder Boring Machine

ALTHOUGH the special No. 8 cylinder boring machine shown was built as a single-purpose production machine for rough boring, semi-finishing, and reaming cylinders for four-cylinder tractor engines, it can be designed as a fixed-center machine for any number of bores of either tractor or automobile cylinders, cast en bloc or single. It it made by the Defiance Machine Works, Defiance, Ohio. The machine is built for heavy duty throughout. The frame and base castings are broad and heavy with cored centers, with internal ribs. Broad and long slides, properly scraped and gibbed, carry an auxiliary sliding table operated by a screw feed through a separate motor mounted on the back of the machine and driving through a right- and left-hand slip friction clutch. Levers for operating the table are in the front of the machine close to the operator's position. This sliding table when in front of the machine makes it possible to load blocks over the fixture that contains revolving bushings into which the pilot bars enter before the actual cutting takes place. The table is raised and lowered through a pair of jack screws. Each screw is retained in a jack and is actuated by a heavy worm and wormwheel and a bronze nut. A simple adjustment is provided for advancing or retarding the screws independently so as to maintain alignment of the table. All thrusts are taken by SKF bearings.



Defiance Extra-Heavy No. 8 Four-Spindle Cylinder Boring Machine

The feed mechanism is of unit construction, providing accessibility for adjustment. The unit is tightly incased and provides its own oil system and splash lubrication. All feed shaft bearings are bronze bushed, and all thrust bearings are SKF ball bearings. A hand adjustment for the table feed is provided, but when the machine is in operation the table automatically feeds the work up to the boring tools, and when through the cut, it automatically reverses at rapid traverse rate to the loading position and stops. By means of double clutches in the feed box, the machine can be set to feed, disengage, rapid travel up, feed again, disengage and automatically return.

The drive to the spindles is by belt from a three-step cone pulley or from a motor connected by a flexible coupling direct to the drive shaft. The spindles are of large size and are made of high-grade hammered steel. Each spindle is supported by three bronze bearings. The nose bearing is conical in shape and adjustment is provided for taking up wear. Each spindle floats between two sets of large SKF ball thrust bearings. Friction brakes are used to stop the spindles after the power has been shut off. The boring tool is fitted to the spindle by a tapered shank and is securely held in place by a long bolt leading through the spindle from the top. This construction prevents the boring tool from being pulled out of the spindle on its return stroke.

The machine occupies a floor space of 11 ft. x 6 ft. 10 in. and its net weight is 21,330 pounds.

Pamphlets Received

RESEARCH LABORATORIES. The Bureau of Standards has issued in miscellaneous publication No. 90 a directory of commercial testing and college research laboratories. A geographical listing of testing laboratories is first given, followed by a similar list of college research laboratories. The listings are under state divisions and city subheads. Coded symbols are used to indicate the type of work that can be carried on in each laboratory listed. The pamphlet contains 48 pages, and may be obtained from the Government Printing Office, Washington, D. C., for 15 cents.

NEWS OF THE WEEK

James H. McGraw Receives Harvard Award for Distinguished Advertising Service

Recognition of his pioneering work in co-ordinating advertising and marketing

"FOR distinguished personal service rendered American commerce and industry through raising the standards of advertising—1927," James H. McGraw received the Harvard Advertising Award for Distinguished Services to Advertising at a dinner held in Boston on Friday night, February 17, under the auspices of the Graduate School of Business Administration of Harvard University.

This advertising award takes the form of a gold medal inscribed with Mr. McGraw's name and the quotation above. He is the third person to be honored with the medal. The two men previously honored are Ernest Elmo Calkins, president, Calkins and Holden, and O. C. Harn, who received the medal in 1926 in recognition for his work as president of the Audit Bureau of Circulations.

The jury of award which bestowed the medal upon Mr. McGraw was made up of the following members: Melvin T. Copeland, professor of marketing, and Neil H. Borden, assistant professor of advertising, Graduate School of Business Administration, Harvard; Frank Braucher, advertising director, Crowell Publishing Co., New York; George M. Burbach, advertising manager, St. Louis Post Dispatch; J. K. Fraser, The Blackman Co., New York; G. B. Hotchkiss, professor of marketing, New York University; Henry Lewis Johnson, president, Graphic Arts Co., Boston; T. J. McManis, assistant manager, publicity department, General Electric Co., Schenectady, N. Y.; Fred T. Singleton, Evans-Winter-Hebb, Inc., Detroit; H. L. Staples, president, Staples and Staples, Inc., Richmond, Va.; and Henry H. Taylor of Taylor and Taylor, San Francisco.

In making the award of the gold medal, which is the greatest honor in the series of Harvard advertising awards, Professor Sprague, who presented the awards in the absence of Dean Wallace B. Donham, spoke of Mr. McGraw's pioneering work in the recognition of advertising's relation to marketing, and of his constructive services in the upbuilding of the highest advertising practices among the organized business press. At the last minute, Mr. McGraw found it impossible to be present because of illness. Malcolm Muir, vice-president of the McGraw-Hill Publishing Co., therefore, accepted the medal on behalf of Mr. McGraw and presented his address, which follows, in part:

"When Mr. Bok established the Harvard Advertising Awards, there was general recognition of their significance. Advertising has come to occupy an important position in the consciousness of the public and of business. Its potentiality—for good or for ill—in the distribution of both industrial and consumer goods, is recognized as tremendous. Such a force must be employed with an abiding sense of responsibility to the public. Such organizations as the International Advertising Association and the Better Business Bureau have been assurances that advertising men recognize this responsibility. But a still more dramatic assurance has been called for, and this Mr. Bok has created in the Harvard Advertising Awards.

James H. McGraw

James H. McGraw is president of the McGraw-Hill Publishing Co., Inc., the largest business publishing organization in the world. It has grown from one paper, purchased by Mr. McGraw in 1888, until today there are published fourteen engineering and industrial publications, twelve in New York, one in San Francisco, and one in London. Mr. McGraw is chairman of the McGraw-Shaw Co., publishers of industrial papers in Chicago. He is also chairman of the McGraw-Hill Book Co., publishers of technical and business books. Mr. McGraw was born in Panama, Chautauqua County, New York, December 17, 1860. He came into publishing from the principalship of an upstate school. He is a member of many engineering, business and scientific organizations.

"At each stage of the business situation, advertising takes on new significance and new obligations. More and more, advertising becomes essential to the economical movement of goods, from industry to industry, from producer or merchant to consumer. More and more does advertising guide preference for commodities and services that, interwoven, form the very warp and woof of our civilization.

"And to soundness of product or service, there must be added soundness of marketing method, if advertising is to be an effective instrument of prosperity.

"Distribution costs are being subpoenaed before the court of public opinion; and too often advertising has had to bear the unjust odium of marketing's shortcomings. The logical markets may have been wrongly appraised. Distribution was attempted under conditions that made the cost prohibitive. Differences in buying habits, according to fields or industries, have been overlooked. Appeals to buyers have not been valid. Distribution channels have not been effectively organized. The sales force has been inadequate, ineffective or mishandled. Yet of advertising is expected the impossible delivery of economical distribution.

Modern Marketing Methods

"It is to the credit of many advertising men that they have been among the leaders in the adoption of modern marketing methods and that, in large number, they are competent counselors on marketing plans.

"We, therefore, have a grave responsibility towards those to whom we offer advertising counsel. Effective advertising must be reared on two sturdy foundations; the first, a product or service which meets existent or unexpressed needs of the market; the second, a waste-free marketing plan for reaching responsible buyers.

"But sound advertising is a remedy for faltering business not alone in spurring the profitable filling of buyer's present wants. We have come to see that the very development of our social structure depends upon the rapid en-

largement of needs and the introduction of new products.

"Through the adoption of production economies, principally the greater use of power and the fruits of research, established industries constantly reduce the number of employees per unit of product. The surplus workers thus thrown off by older industries must be absorbed into new ones, otherwise we shall have widespread unemployment, lowered standards of living, suffering, discontent. It is the rôle of consumer advertising quickly to introduce new products to a mass market, and thus create new demands for surplus labor. The automobile, the motion picture, rayon and a score of like products could not have been made servants of our common life so quickly had it not been for the penetration of advertising into every nook and corner of this country and through every purchasing level.

"Advertising's place in such development of new products is clear. What would be the price situation in the shoe, the furniture, the carpet, and other staple industries if they were trying to employ the men and money which have gone into the automobile, rayon and motion picture businesses? New enterprises absorb surplus labor, create new purchasing power, stimulate consumer ambitions, render business profitable and make for social well-being. Advertising is the loudspeaker for development.

"In thus adapting advertising to its destined sphere of usefulness, we of the business press have endeavored to do our share. The consumer medium creates consumer demand and directs the consumer to the dealer. Our function is to move goods from industry to industry, and from maker to distributor. To no small degree, industry's profits are measured by economies in those many inter-industry and inter-merchant movements which lie back of the final sale.

"That the advertising world is fully aware of the importance of the business paper in serving industry, trade and the public, as an ally of the consumer medium, is indicated by the award of this medal, this high honor, to a business paper publisher tonight.

"We can look with great hope on advertising's promise for the maintenance of prosperity. Advertising has an important rôle in widening the profit margin in both industrial and consumer transactions. It removes products from unhealthy price competition, as fast as it can unearth distinctiveness in products and organizations. It reduces production cost by insistence, in the planning of campaigns, on conformity of goods to needs, and on standardization and simplification. It reduces distribution costs by challenging unsound marketing programs.

"In all this, advertising works for the public as well as for the advertiser. It helps stabilize industry, and thus employment and dividends. It emphasizes quality and use, which, with price, are sounder criteria of value than price alone. It assures, through price stabilization, the continued improvement of product and the development of new products to minister to the consumers' needs.

"For myself and my colleagues in business paper advertising, I pledge you our best endeavors in a continuance of study, research and experiment, to correct misapplication of advertising, to make it a still more effective tool of business, and a still more beneficent agent in advancing the public welfare."

German Machinery Industry Reported on Upward Swing

Modernization and government aid are biggest factors

IT IS believed that 1927 was one of the greatest production years in German history, according to a report submitted to the Bureau of Foreign Commerce by Trade Commissioner Theodore Pilger, Berlin. Much of the recovery made by the German machinery industry since the beginning of 1924, states the report, may be attributed to four factors: Activities of organizations, foreign loans made to Germany in the period 1924 to 1927 inclusive, Governmental support of the engineering industries, and good labor at low wages.

The building of machinery and related engineering activities in Germany is one of the most important industries. A census taken in 1925 shows that 15,965 distinct German factories were engaged in the building of all kinds of machinery. Germany is flooded with machinery factories. The number seems out of proportion to possible home or foreign markets obtainable. Germany employs 21 per cent more persons in its machinery factories than are thus employed in the United States, but each man has only 1.04 hp. furnished to him, as compared with 3.38 hp. per employee in the United States. Largely for this reason, the American workman produces $4,640 worth of machinery per year, which is over four times the equivalent production of the German workman.

The fact that even in 1925, from 35 to 39 per cent of the total production was for export, shows the importance of foreign markets for the German machinery industry, and if the excess manufacturing capacity available in Germany were to be used, it would doubtless greatly increase this proportion. The relative importance of export markets to the United States and to Germany is shown by the relations of 6.7 per cent and 39 per cent respectively.

The machinery trade from and to Germany in 1926 gave an excess of exports over imports amounting to 706,000,000 marks, which is one-eighth of the total excess exports of that year, for all important manufactured commodities which showed an export surplus. Before the war, machine tools formed a large share of the German machinery imports, particularly those coming from the United States. Since the war this trade in machine tools has never returned to the pre-war level, but a part of the loss has been replaced by the sale of special industrial machinery.

The past year was a record breaker in German machinery importations, having exceeded 1926 imports by nearly 50 per cent, in both value and tonnage. This increased importation of machinery is a reflection of Germany's great strides in modernization.

The United States has been furnishing a considerable part of these increased German imports. German industrialists are looking to the United States for the latest and most modern equipment in every field, and a large number of American companies have obtained a share of this German modernization machinery business. The value of German machinery imports in 1927 was 30 per cent over the record in 1913. This was the greatest machinery import business in point of value that Germany has ever done.

Exports of machinery have shown a steady increase since 1924. They have not yet reached the pre-war tonnage, however. In 1927, 458,000 tons of machinery were exported with a value of 870,000,000 marks, about 87 per cent of the pre-war value when corrected for the higher price level now existing.

Official statistics recently issued by the German Government for the calendar year 1927 show that German machinery exports to the United States (13,528 metric tons) were 99 metric tons greater than the German machinery imports from the United States (13,429 metric tons). In 1913 the United States was the thirteenth customer for German machinery. In 1925 it was the fifteenth, but in 1926 it rose to the sixth place as a buyer of German machinery. Although 1926 was an extraordinary year, it does appear that the United States is steadily increasing its purchases of German machinery.

German machinery builders in line with all other German manufacturers have found it advisable to report their fixed capital as low as possible. German manufacturers do not feel sure of their economic future, and for this reason are avoiding as much as they can, the possibilities of a capital levy, or of heavy property taxes. Despite enormous enlargements made during the war, and especially during the inflation, the statements of fixed capital are almost the same now as in the year before the war.

Although the inflation was a disaster

to many Germans, it cleared the decks for German machinery manufacturers. Legal and other reserves, together with long-term obligations, were almost completely wiped out. However, although short-term credits were also removed at that time, German machinery manufacturers have again fallen back into their habit of financing the customer, and their short-term obligations were already greater again in 1925 than they had been in the pre-war days.

German machinery manufacturers claim that both the design and material entering their equipment is now much better than before the war. It appears that considerable progress has been made in improved design based principally upon the better raw material now obtainable. Germany is now using higher grade iron ores imported from Sweden, Spain, and Morocco instead of the low grade "spath" ore from the Siegerland and the "minette" ore from Lorraine. Furthermore, Siemens-Martin furnaces are being used in the manufacture of steel to a much greater extent than heretofore.

No Wage Increase Likely

Although the trend is upward it is not believed that any rapid increase in wages is likely. Efficiency and output are rapidly increasing by the use of greater power, and the adoption of American production methods. In 1927 there was a proportion of one salaried employee to each four wage workers in German factories, which compares with a relation of 1 to 5 in 1913. This accounts in part for the high German "overhead" still carried over from the inflation.

In 1927, each thousand workmen were divided as 494 skilled mechanics, 170 apprentices, 193 semi-skilled workmen, 107 unskilled helpers, and 46 miscellaneous women, boys and clerks. Although the legal working day is now 8 hours in Germany, there is no difficulty in obtaining workmen for overtime at the regular hourly wage. About 50 per cent of the German machinery factories in 1926 were working more than 48 hours per week.

Concentration has been actively forced in Germany as a result first of inflation, and more recently because of the necessities of competition. This consolidation movement has been more evident in the basic raw material field, than in the finished manufactures branches. At the end of 1926, 54 producers, out of a total of 84, operating in the production of iron and steel, were consolidated into trusts which controlled 98 per cent of the total capital in this industry, while the remaining 30 "independents" only controlled 2 per cent of the industry.

Government support to the German machinery industry embraces: Reduction of 50 per cent on the inland freight rate covering export shipments of machinery, government export credit insurance, government guarantee of export credits granted to various purchasers, government ownership or controlling interest in a number of machinery factories, furnishing special banks with funds at rates below the regular market, these funds being available to finance export shipments, support of standardization and simplification programme, countenancing of cartels, trusts and other price-regulating organizations, and permitting the practice of selling abroad cheaper than in the protected domestic market.

Foundry Equipment Association Elects Officers

At the annual meeting of the Foundry Equipment Manufacturers' Association, held in Cleveland, February 7, S. C. Vessy, of W. W. Sly Mfg. Co., Cleveland, was elected president and Henry W. Standart, of Northern Engineering Works, Detroit, vice-president. H. Cole Estep, Cleveland, was re-elected secretary-treasurer. Mr. Standart was also elected a director, together with A. F. Jensen, Hanna Engineering Works, Chicago. Mr. Vessy was re-elected a director. In addition to the foregoing, the board now includes T. W. Pangborn, Pangborn Corporation, Hagerstown, Md., past-president, and E. O. Beardsley, Beardsley & Piper Co., Chicago.

The report of the secretary-treasurer showed that the association has reached a high point in number of members and financial resources. The reports on business conditions presented at the meeting showed that somewhat better conditions have prevailed since the first of the year. It was agreed at the meeting to take steps to enlarge and amplify the statistical work of the association.

The members were addressed by Whiting Williams, Cleveland, on the subject "What Is Industry Doing to Us," and by E. F. DuBrul, manager, National Machine Tool Builders' Association, who discussed the possibility of common action between trade associations.

National Uniformity in Bolt and Nut Sizes

Tables of standard sizes for square and hexagonal bolt heads and nuts, and for the corresponding wrench openings, were recently approved by the American Engineering Standards Committee as a Tentative American Standard. The tables were established with much effort and care by a sectional committee appointed under the procedure of the A.E.S.C. by the organizations sponsoring this work. The sectional committee, under the chairmanship of Prof. Arthur E. Norton, of Harvard University, is sub-divided into several sub-committees, each dealing with a special subject. A sub-committee, of which Commander T. C. Kinkaid, of the Navy Department is chairman, worked out the above mentioned tables. These deal with rough, semi-finished and finished square and hexagonal bolt heads and regular nuts, finished hexagonal capscrew heads, setscrew heads, finished and semi-finished hexagonal jam nuts, hexagonal light nuts, hexagonal and square machine screw nuts, and stove bolt nuts, hexagonal castellated nuts, and wrench openings.

The new standard is meant to introduce national uniformity in a field where wasteful diversity has reigned for a long time. The sizes of bolt heads and nuts are intended to supersede all existing standards which have grown up from commercial standard bolt heads and nuts. The dimensions listed are in accord with the tendencies of recent years toward smaller sizes for bolt heads and nuts than were given by the U. S. Standard, thus called because it was established by the Navy Department in 1868. However, such reduction has been made only after giving due consideration to the stresses in bolts and nuts and after exhaustive tests of samples had been made.

The standardization of wrench openings corresponding to the different widths across flats or bolt heads and nuts is a very important feature. The opening of a wrench to go with a specific nut should be large enough to permit the wrench to be easily slid on to the nut, and small enough to avoid damage to the corners of the nut when it is tightened. These two requirements result in certain tolerances for both the nuts and the wrench openings. The tolerance on the nut is allowed downward from the nominal size, while the minimum size of the wrench opening is slightly above nominal size, the tolerance on the wrench opening being upward from this reference line. This results in a clearance between even the largest permissible nut and the smallest permissible wrench opening of a specific nominal size.

If bolts and nuts on the one hand, and wrenches on the other hand, are made in accordance with the new standard, all wrenches of a certain size will match in a mechanically perfect manner, all bolt heads and nuts of the same nominal size whatever their make may be. This will not only simplify stock of materials and tools, but it will also give a considerable saving in time and effort in the work of the countless number of persons who have to use bolts and nuts as fastenings.

Copies of the standard may be obtained from the American Engineering Standards Committee, 29 West 39th St., New York.

Auto Parts Abroad

Exports from the United States of automobile parts for replacement, of accessories, and of service appliances during the first ten months of 1927 reached a total of $54,494,757, as compared with $43,644,603 during the same months of 1926, or an increase of 24.86 per cent. Canada remains the best customer, with the United Kingdom second in the lead, and Germany third, but with the last-named bidding fair eventually to eclipse all others if the increase is maintained.

The Business Barometer

The outlook in Commerce, Finance, Agriculture and Industry

By THEODORE H. PRICE

Editor, Commerce and Finance, New York

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IF A REAL barometer of business had been contrived, it would probably indicate that a change in business conditions was at hand, for there is much evidence that the public is becoming more critical in its attitude toward current developments. But this is not to say that the impending change would be unfavorable or undesirable, for nothing that makes people think is objectionable, and we will be better off if we lose some of the excrescent growths that have attached themselves to our prosperity.

Therefore it is not to be regretted that speculation in stocks is subsiding and that a gradual and orderly liquidation is in progress. As yet it has not had much effect upon brokers' loans or interest rates, but it will tell in time, and the Federal Reserve Banks deserve credit for their courage in putting on the brakes when they did.

It is said that the Federal Reserve Board is divided as to whether the banks should act as a unit or independently in raising or lowering the rediscount rate, but that the weight of opinion favors independence of action, because it appears to have been contemplated by the Federal Reserve Act, and is opposed to centralization, as Congress was when it passed the Act. Certainly the wisdom of allowing each bank a wide discretion in such matters has been demonstrated during the past fortnight, for the deliberation with which rates were raised has had the desired effect without causing any shock or dislocation. Therefore it seems safe to assume that the security market faces a period of digestion during which a substantial portion of the securities held on margin will pass into the hands of investors who will pay for them and put them away. As to whether this transfer will be accomplished at the present price level depends upon the conditions of trade and industry.

Thus far unemployment is about the only feature of the situation that need cause any serious apprehension. During the week there has been an undoubted increase in the number of the jobless seeking relief in the cities.

The Bowery lodging houses in New York are crowded to capacity, the "bread lines" are said to be the longest since 1896, and the Standard Statistics Co. published some figures which seem to indicate that "3,500,000 workers have been released from their former employment since 1923." But it is not to be inferred that this number are necessarily out of work. The high wages paid for several years past have made it possible for many to take a holiday, and some students of the facts maintain that the floating labor of the country is now seeking the warmth of the cities because work in the open at this time of the year is something of a hardship.

Perhaps the political situation should also be considered in its bearing upon business, for Mr. Hoover's formal announcement of his candidacy has keenly disappointed those who were hoping against hope that Coolidge would be "drafted," and the many investigations that Congress is planning will not add to the complacency of business men. Most of these inquisitions have a political purpose, but they are not for that reason less objectionable to business.

WHAT'S DOING IN INDUSTRY

CONSIDERED from a broad viewpoint, business as a whole is quite active throughout the country. The only notable exception is in textile machinery manufacturing in the South. Chicago reports a slight decline over January figures in general lines, and in certain other sections, such as New York and New England, conditions may be said to be spotty. In both these centers, while many companies are extremely active, others are comparatively inactive.

CANADA has the brightest prospects. Here several railroads have placed large orders for machine tools, rails and rolling stock. The reopening of several large automotive plants is also expected to help allied lines, and a general revival of business is evident. Automotive purchases constitute the bulk of machine tool business in several other localities such as Indianapolis and Cincinnati. Automotive buying in Chicago, however, is not up to expectations. Railroad purchases outside of Canada are steady, but conservative.

ACTIVITY in the furniture line, both in the South and in the Indianapolis district, has brought considerable business to manufacturers of woodworking equipment. Contracting equipment, particularly road-building machinery, is also in demand in both these sections. In New England, the high light is the large Navy orders received by the Pratt & Whitney Aircraft Co. for "Wasp" engines.

But despite politics and unemployment a distinct improvement in many lines of trade is discernible. Car loadings for the first nine days of February are nearly up to last year. The pick-up in the wholesale spring trade is not quite as fast as expected, but the trend is upward. The American Woolen Co. advanced prices by from 2½ to 5 per cent, and other manufacturers are following the lead thus set.

The domestic consumption of cotton in January was surprisingly large in view of the widely advertised curtailment, and many lines of cotton goods are higher. Raw cotton has had a substantial recovery. It is now well above 18 cents and would probably go higher if it were not feared that the advance would lead to an increase in acreage. No. 2 yellow corn has sold at $1.00 a bushel in Chicago.

The F. W. Dodge Co. reports that the new building in January was 11 per cent over last year in 37 cities east of the Rocky Mountains. Merchandise exports for January exceeded imports by $73,000,000 as against $78,000,000 in 1927.

A further decline of nearly four cents in rubber means cheaper tires, although it has been something of a shock to the rubber trade, which now takes it for granted that the British control of exports will be abandoned. Sugar is intrinsically cheap, and at 2⅜ cents ex-duty landed New York for Cuban raws, it is approaching an investment basis. Coffee continues to be "stabilized," and consumers wisely continue to buy from hand to mouth.

Looking beyond the boundaries of the United States, Russia and China are the only countries in which conditions bespeak any serious unrest. Such news as sifts through from Russia appears to indicate that the political pot is boiling although the lid has not yet blown off. In China it is the old story of factional warfare, although trade in the neighborhood of the treaty ports seems to be but little disturbed. In England things are getting better. Exports are increasing, imports are decreasing, and Premier Baldwin says that the labor situation is much improved.

Foreign loans that aggregate more than half a billion dollars are said to be under consideration by American bankers. These loans, if arranged, will greatly stimulate business in Europe and provide American credits out of which our exports can be paid. So buttressed our position seems to be secure and we ought to have a fairly prosperous spring if the ogre of unemployment vanishes.

The Industrial Review

Weekly progress of the machinery and machine tool business

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

CINCINNATI

The machine tool industry in the Cincinnati district made a slight gain in the past week, about one-half of the manufacturers reporting that they booked a slightly-increased number of orders in the period and the remainder stating that they had at least held their own. Selling agents report that while the week was rather dull, they feel that a better market is developing.

Several tools were called for by orders in a few scattering instances, but by far the greater portion of the week's business was made up of sales of single tools and replacements. The great majority of the buyers were general machinists and miscellaneous users, located in all sections of the country, and the orders were well diversified in the matters of sizes and types. An increased number of orders was received from concerns in the automotive and allied industries, but almost all of these were for single tools, for replacement purposes. A few shipments to the oil fields of South America and to Canada were reported.

An increased number of inquiries from all sections of the country are reported as having been received in the past week, the great majority of these being in regard to single tools and replacements. Some of the manufacturers report that inquiries came in more freely from the automobile manufacturers and the allied lines than they have for some time and this gives basis for a feeling that the sales prospects in this field are getting brigher.

CANADA

Further orders for rolling stock and equipment have been placed by Canadian railways during the last two weeks. The Alberta Government Railways have ordered four locomotives from the Canadian Locomotive Co. Extensive orders have also been placed by the Canadian Pacific Railway, while the Montreal Locomotive Works reports the receipt of orders from the Aluminum Co. of America; the Toronto, Hamilton and Buffalo Railway; and the Quebec Railway, Light and Power Co. In addition, the Canadian National Railways have purchased a considerable quantity of machinery and tools, the orders having been distributed among John Bertram and Sons, Ltd., Canadian Westinghouse Co., Canadian Ingersoll-Rand Co., J. Matheson and Co., and Williams and Wilson, Ltd. It is understood that additional orders will be placed soon.

The automotive industry is getting into its stride now that practically all the new models have been announced. Work has been started in the larger plant of General Motors of Canada, which has been idle for some time. Willys-Overland is completing a considerable addition to their plant in Toronto.

Under the impetus of expanding demands from both the large and smaller buyers, blast furnaces and mill operations have been rapidly increasing. The mills of the Algoma Stee. Corporation, at Sault Ste. Marie, are still well employed. Canadian railways have augmented orders placed recently with the company, to an extent that will assure the operation of the rail mill for some months.

Warehouse sales are reported to be good, and small machine shops and manufacturing plans seem to be quite active. The foundry and machine shop of the Allard Machine Works, New Westminster, B. C., has been kept busy turning out a large order of machinery for the new plant of the Fraser Valley Tie and Lumber Co. It is understood that orders for mining machinery, totalling many millions of dollars, have been placed in Chicago, Cleveland and Montreal for the Northern Manitoba mineral belt since Nov. 1. Most of this mining equipment must be delivered before the spring.

SOUTHERN DISTRICT

While machinery, machine tool and mill supply sales in the southern district have shown but little improvement in the last two weeks, reports of larger distributors are to the effect that business is holding its own, that sales compare favorably with those for the corresponding period last year, and that business up to the middle of February was somewhat better than most dealers had looked for.

In the woodworking field sales continue to be considerably larger than usual for this period, with the furniture industries in the Southeast especially good buyers. There seems now to be little doubt but that business the first quarter of 1928 will be the best for this period it has been in several years.

Fair business also is reported in the garage and service station field, but not as large as the volume at this time last season, when sales were unusually large. Considerable of this business is in the used or rebuilt machinery line, while the same is true of sales to smaller machine shops, which have not been active buyers for some time.

Demand for contractors' equipment and building machinery is picking up steadily, and with one of the best building years in the history of the Southeast in prospect, this business promises to be active for some months. Road building sales have not yet opened up on a very active basis, but promise to do so within the next few weeks.

Railroads continue active in the market for heavier machinery, and due to the large amount of construction planned by southeastern railroads this session the outlook is unusually good. Textile machinery is about the only line of importance not selling actively at this time.

INDIANAPOLIS

Some continued improvement features the local machinery and machine tool demand, and there are indications that this increase will continue until the spring season opens up. Just at the present time most of the machine tool business comes from the automobile industry. The volume is not as large as the trade expected, but it is better than it was at this time last year. This is particularly true of smaller replacements. It is apparent now that no notable expansions will take place this year in the automobile factories and most of the business will be confined to replacements.

Inquiry for heavy machine tool equipment is good and prospects are bright, but actual orders are scarcer than was expected. A good volume of inquiry now is beginning to be received from the contracting trades, particularly from road construction men. Inquiries for steam shovels, special road-maintenance equipment, and also concrete mixers and similar machinery. From all indications this variety of equipment will be in considerable demand. It is pointed out by contractors that many of the machines they purchased from the government after the war, or at bargain prices during the peak of the deflation period, are wearing out and it is imperative that they do some buying.

The iron and steel industry in the state also is beginning to put out some feelers. Up to the present time little buying is done, but production is being increased quietly and a good business is expected from this source. A particularly bright spot is the furniture industry where manufacturers of special woodworking machinery, lathes, routers, sanders, planers and the like are finding more interest in quotations than for several months. Orders are being placed also.

Railroad buying thus far has been disappointing. Better weather however, that will permit conserving of both rolling stock and motive power, is expected to make more work in the shops. Inquiries are out for some small equipment and sales are expected in greater volume as winter wanes.

NEW ENGLAND

Opinions from representative dealers in the New England machinery and machine tool field, rated business in the past week from dull to very good, indicating a spotty situation. The used equipment demand included a Gridley 4-spindle automatic, a Brown & Sharpe 5-spindle automatic, New Britain screw machines; presses, a number of grinding machines and a chucking machine.

Inquiries for new equipment hold up well but comparatively few closings were reported. A Connecticut builder closed on an outstanding list of over a hundred units. The Boston Schoolhouse Department received bids Tuesday for milling machinery, lathes and sheet metal working machinery. Orders for single tools represented the majority of the bookings. A Bridgeport concern has received a number of orders for small riveting machines.

Industrial conditions continue to gain momentum. Increased working schedules are reported in all sections. A Southern Connecticut concern manufacturing automobile hardware has tripled its order balance since the first of the year. Pratt & Whitney Aircraft Co. closed on orders for 96 Hornet and 50 Wasp engines for the United States Navy representing $1,500,000. This brings the total on order to 177 Hornet and 450 Wasp engines.

NEW YORK

Increased activity has been noted in the metropolitan district in the past week, although it is generally conceded that what business there is in machine tool sales must be gone after, as few inquiries are reported except from some of the larger companies, who are regular buyers. One dealer handling a well-representative line, predicts that his February sales will exceed those of January, which was considered a good month. Here and there an exception stands out: One New York representative admitted he was at a standstill, although the general sales of his company's product in other territories was considered excellent.

The local market was affected to some extent by the sale of used equipment, notably through an auction of rebuilt machines held in the warehouse of one of the largest dealers, also through the sale of equipment in a discarded plant.

Railroad buying is said to be picking up, but most of the orders noted were from

scattered industries. Among the machines sold were: nine lathes ranging in size from 13 to 20 in.; two vertical shapers, 6 and 12 in.; two profilers; several hand millers; one Sigourney drill; two radial drills; one 5-in. horizontal boring machine; one press brake; several tool grinders; one jig borer; and a miscellaneous lot of small equipment.

CHICAGO

A slight decline in the volume of machine tool business thus far in February as compared with the first half of January is generally reported by the trade. There have been a number of sales of single tools, and, in a few cases, of small lots, but these have been scattered, general industry furnishing the bulk of the orders. Most concerns manufacturing or dealing in standard machine tool products are counting on prospective railroad business to bring the average up to the level reached in January, which was an exceptionally satisfactory one. At this writing the Santa Fe still is the only road to have submitted lists specifying requirements in the way of shop equipment, but other trunk lines are expected to follow suit shortly.

Buying by automobile manufacturers so far this year has not come up to what had been hoped for in view of the orders taken for cars reported by the leading makers. Sales to agricultural machinery and tractor plants have not taken on any considerable volume up to the present, although constituting a material factor in the total of machine tool business. Used tools are in moderate demand but competition, however, has induced price cutting with attendent small profits in many cases.

DETROIT

The machinery and machine tool market in the Detroit district is fully justifying the optimistic predictions that were made early in the year. Not only are the dealers reporting more and better inquiries and orders, but there is every indication that the apparent prosperity is very well established.

All of the automobile plants are active, some of them a great deal more so than others. Production at Chevrolet has gone ahead rapidly, Pontiac has exceeded expectations, and Dodge is making plans for a greatly increased production. Ford is increasing both his output and his staff and will soon be turning out 2,000 cars a day.

All of the body plants are active and many of them are placing orders for equipment. The small shops are also busy and are ordering machines from time to time. Employment this week showed a gain of 4,500, the largest in many weeks. Machinery dealers, automobile men, statisticians and bankers predict an unusually prosperous six months.

Simplification of Hacksaw Sizes Under Way

It is learned from the Division of Simplified Practice, Department of Commerce, that the hacksaw manufacturers completed the procedure of forming an association, on Jan. 25, representing practically the entire industry. William P. Jeffery, of the law firm of Jeffery and Redmond, was elected managing director with offices at 14 Wall St., New York City.

In simplifying hacksaw sizes, a complete and exhaustive survey was made with proper consideration of the demand so that elimination would not be carried out too far. As a result, a simplified list of sizes was developed with four sizes for hand saws and twelve sizes for power saws. The number of teeth per inch was decided upon for each size to conform with present greatest demand. This list was unanimously approved by the association.

The Division of Simplified Practice at the request of the new association is to call a conference to recommend the simplified list of sizes to the distributors and users. A tentative date has been set for March 21, at the Commerce Building in Washington. The association is also conducting a series of tests to determine the proper width and thickness of saw blades for various cutting jobs.

Fairchild Expands

The new factory of the Fairchild Caminez Engine Corporation, manufacturers of the air-cooled aircraft engine bearing its name, will be completed March 1. It is located at Farmingdale, N. Y., and will have an initial production of twelve engines a week. Adjacent to it is being constructed the new factory of the Fairchild Airplane Manufacturing Corporation, builders of the Fairchild "All-Purpose" cabin monoplane. It will be finished May 1 and will have a production capacity of four planes a week at the outset. The new factories and flying field represent an investment of $600,000. These two subsidiaries of the Fairchild Aviation Corporation were organized two years ago.

The Caminez engine is unique in that the pistons operate directly on the drive cam without the medium of connecting rods. The cam mechanism is the invention of Harold Caminez, formerly in charge of engine design for the engineering division of the United States Army Air Corps at McCook Field, Dayton, Ohio.

Parts Jobbers Organize

With a charter membership of thirty-eight of the leading jobbers of automobile parts in the Southeastern territory, the Southeastern Parts Jobbers' Association was organized at a meeting in the Henry Grady Hotel in Atlanta the latter part of January. A. E. Parrish, of Nashville, Tenn., was elected president for the coming year. The new association will be affiliated with the National Standard Parts Association, and was formed to promote the interests of automotive parts jobbers in the group of Southeastern states, and to educate the automobile owning public to the use of standard parts. Other officers elected were Robert Maddox, Miami, Fla., vice-president; and John Taylor, Columbia, S. C., secretary and treasurer.

Business Items

The Equipment & Supply Co., Louisville, Ky., has opened up an office and display room in that city.

The Detroit Boring Bar Co., Detroit, Mich., has been organized to manufacture its own design of boring bar and to sell other types. The company is operating in the plant of the Waterman Corporation.

The National Supply Co., Toledo, Ohio, is now representing the Liberty Machine Tool Co., Hamilton, Ohio. Northwestern Ohio is being covered from the Toledo office, while Indiana is being covered from the Indianapolis office of this agent.

The Metal Door and Trim Co., of LaPorte, Ind., has just occupied its new offices, including also a $250,000 plant addition so constructed as to display all the hollow metal products manufactured by the company.

The Hart & Cooley Manufacturing Co., New Britain, Conn., controlled by the Hart & Cooley Co., Inc., recently added two new directors. H. W. Maier and E. S. Johnson are the new members. Officers and other directors were re-elected.

The Electric Boat Co., New London, Conn., has purchased the entire assets of the new London Ship & Engine Co. The change was effected through a merger. The Electric Boat Co. previously had control of about 90 per cent of the subsidiary company.

The Johnson Cutlery Works, Wauchula, Fla., is establishing a plant in that place for the manufacture of cutlery products, it was announced recently by J. W. Johnson, president of the company. It is also announced that machinery and equipment for the plant have already been purchased.

The working force of the Delco-Remy Corporation at Anderson, Ind., has reached 7,300, a new high mark for the winter season. This is several hundred more employees than at the same time last year. All departments of the plant have been operating steadily.

The Corpus Christi Boiler, Welding & Machine Works, 716 Carrizo St., Corpus Christi, Tex., has awarded contracts for the construction of an additional unit for the main plant, it has been announced by J. O. Brouse, general manager. The building will cost about $15,000, not including machinery and equipment.

The Georgia Steel & Iron Co., Tallapoosa, Ga., manufacturers of plate steel and other metal products, has started work on the new plant and expects to have it in operation during the coming summer. An investment of approximately $100,000 is contemplated. A building has been leased and is being remodeled.

The Wagner Electric Corporation, St. Louis, Mo., announces the opening of a sales office at 1006 Washington Ave., Houston, Texas. Warehouse stocks are carried at both Houston and San Antonio. W. B. Arbuckle has been placed in charge and will cover south Texas, including Beaumont, Houston, San Antonio and south to the Rio Grande.

The Wagner Electric Corporation, St. Louis, Mo., has announced the recent opening of a southeastern branch office in Atlanta, Ga., at 475 W. Peachtree St., N. E., to handle the company's trade in the Georgia, Florida and Alabama territory. Roy F. Druschky, formerly a salesman in the St. Louis district has been appointed manager of the branch.

The Continental Gin Co., Memphis, Tenn., manufacturers of cotton gin machinery, parts and similar equipment, has announced plans for the erection in Memphis on Poplar Ave., opposite the company's plant, of a special building to be used for the exhibition and demonstration of its products. An investment of about $35,000 is contemplated.

Controlling interest in the Indianapolis Castings Co., Indianapolis, Ind., has been acquired by John L. Wallace, vice-president and general superintendent for many years, from Frank W. Lewis, founder of the company. Mr. Lewis will retire from active business. Mr. Wallace will become president, and G. J. Walker will succeed him as general superintendent.

Articles of incorporation have been filed with the secretary of state in Indianapolis by the Bantam Ball Bearing Co., of South Bend, Ind. The corporation has an initial capital stock of $150,000 and is formed "to manufacture, buy, sell and deal in machinery of any and all kinds, especially ball bearing and roller bearings." The incorporators are George Firmin, Vitus G. Jones and Roland Obenchain.

W. H. Nicholson & Co., of Wilkes-Barre, Pa., manufacturers of expanding mandrels, arbor presses, flexible and compression

couplings, and steam specialties, announces the opening of a branch sales office at 1669 Montpelier St., Dormont, Pittsburgh, Pa. Mr. Ralph A. Comstock has been appointed district sales manager. The office will cover western Pennsylvania, eastern Ohio and West Virginia.

The American Electric Motor Co., Cedarburg, Wis., recently became a subsidiary of the Splitdorf-Bethlehem Electrical Co. of Newark, N. J. The motor company, with its new plant at Cedarburg, will continue to manufacture a line of self-ventilated polyphase induction motors from ½ to 125 hp. W. R. Davis has been appointed general manager of the American Electric Motor Co. W. M. Sprinkman will have charge of industrial sales.

The Weslaco Machine Works, recently organized and incorporated at Weslaco, Tex., with a capital stock of $15,000, is establishing a new machine shop there which will be ready to operate within the next few weeks, it has been announced by L. L. Crosby, president and general manager of the company. Machinery and equipment for the plant has already been purchased. W. O. Simpson is named as secretary of the company.

The Perfection Gear Co., Chicago, Ill., manufacturers of timing gears, ring gears, timing chains, transmission and differential gears, etc., announces the recent opening at 298 Ivy St., N. E., Atlanta, Ga., of a new branch to handle the company's trade in the group of southeastern states. A. W. Fickett, formerly of Atlanta, who has for some years been with home offices of the company at Chicago, has been appointed district manager in charge of the new branch.

The Cleveland Machinery Co., manufacturers and distributors of machinery and mill supplies, announces the removal of the company recently from Cleveland, Tenn., to Chattanooga, Tenn., and an amendment to the charter which enables the company to reorganize under the name of the Horner & Vance Supply Co. The company specializes in woodworking equipment, and plans expansion of its field to cover a large part of the Southeast. Charles A. Horner is general manager of the company, and Garnett Horner is secretary.

The Newman Machine Co., Greensboro, N. C., one of the largest manufacturers and distributors of woodworking machinery in the Southeast, plans the erection this year of a substantial addition to its plant at Greensboro, it has been announced by George F. Newman, president. The additional unit will add nearly 45,000 sq.ft. of floor space to the main machinery plant, and will cost approximately $75,000. Later on the company will erect a new foundry department. Capital stock recently was increased to $500,000 to take care of the expansion program.

The Fusion Welding Corporation, Division of the Chicago Steel and Wire Co., 103rd St. and Torrence Ave., Chicago, announces that its new engineering and research laboratories are now completed. These laboratories include a well-equipped workroom supplied with various forms of alternating and direct current for welding, as well as oxy-acetylene cutting and welding equipment. There is also a photographic darkroom equipped with the latest type of metallographic microscope. Another room contains the necessary desk and office equipment, as well as a library and provision for projecting lantern slides and motion pictures.

Personals

ROBERT C. DEALE has become associated with the Charles E. Bedaux Co., industrial engineers, New York, N. Y.

O. B. ILES, president of the International Machine Tool Co. of Indianapolis, Ind., has been reappointed national councillor of the Indianapolis Chamber of Commerce.

PAUL S. SECK, formerly with the Chicago branch of the Columbia Tool Steel Co., has resigned to become connected with the Ziv Steel & Wire Co., of Chicago, where his headquarters will be.

O. D. FRIES has been appointed salesman in charge of consumer motor business in the Detroit territory, by the Lincoln Electric Co. He will be under the direction of J. M. Robinson, district manager.

J. E. WEBSTER was recently appointed chief plant engineer of the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Co. His former title was engineer of works.

ED. S. CHAMBERLAIN has joined the Triplex Machine Tool Co., New York City as machine tool salesman. In the past he has been connected with the National Tool Co. and Kearny & Trecker Corporation, traveling the New York territory.

A. E. KAISER has been appointed director of production of all the works of the Westinghouse Electric & Manufacturing Co. In 1919 he was made director of production of the East Pittsburgh plant and later became assistant works manager of this plant.

M. W. MCARDLE was elected president of the Chicago Flexible Shaft Co., Chicago, Ill., at a recent meeting of the board of directors. He has been identified with the company for 25 years and formerly held the position of vice-president and general manager.

EARL R. NICHOLS, formerly with the Service Steel Co., of Detroit, has joined the Peter Smith Heater & Manufacturing Co., makers of pressed steel products and located at 10501 Haggerty Ave., Fordson, Detroit, Mich. Mr. Nichols will devote his efforts toward developing pressed steel stamping business for this company.

COMMANDER MARIO CALDERARA, formerly Italian Air Attaché at Washington, is in New York on business. He is the general European representative of the Pioneer Instrument Co., and in addition has specialized in arranging European licenses for the manufacture of products of American design.

JOHN E. FREDERICK, general manager of the Kokomo Steel and Wire Co., Kokomo, Ind., and chairman of the board of the Continental Steel Corporation, has announced his candidacy for the Democratic nomination for governor of Indiana. Mr. Frederick has been president seven years of the Indiana State Chamber of Commerce.

W. D. HAMERSTADT, HENRY LANGSENKAMP and FRANK O'NEIL were elected as executive committee members at the last meeting of the Foundrymen's Association of Indianapolis. Officers of the association all were re-elected. They are T. J. Cornwell, president; Guy E. Street, vice-president; James H. Hooker, treasurer, and A. J. Allen, secretary.

F. B. WILKINSON has been elected president of the Logansport Machine Co., of Logansport, Ind. R. R. Johnston is vice-president and B. F. Long is secretary-treasurer. In addition to the officers, members of the board of directors were elected as follows: Charles Richardson, R. J. Johnson, J. P. Henderson and S. O. Cook.

E. J. SHULER has joined the engineering staff of the Fusion Welding Corporation, 103rd St. and Torrence Ave., Chicago, Ill. Mr. Shuler was for eight years in full charge of welding for the New Orleans Public Service Corporation. While in New Orleans he did a great deal of advanced development work in connection with fusion welding and cutting by the various processes.

E. C. BRANDT and F. J. SHIRING have been appointed assistant works managers of the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Co. Mr. Brandt was formerly works manager of the Homewood Works, where he is succeeded by S. C. Hoey. Mr. Hoey had previously been superintendent of the manufacturing engineering department. Mr. Shiring was superintendent of motor apparatus.

Calendar of Local Meetings

National Association of Cost Accountants

Baltimore Chapter. April 17. Subject: "The Budget in Manufacturing—Application of Budgetary Principles and Their Performance."

Boston Chapter. April 26. Subject: "Cost and General Accounting Procedure for a Paper Mill," by Homer A. Sargent.

Buffalo Chapter. April 26. Hotel Buffalo. Subject: "Debatable Questions in Industrial Accounting." By Clarence S. Marsh.

Cincinnati Chapter. April 17. Subject: "Accounting for Value of Fixed Assets," by H. G. Baldwin.

Chicago Chapter. April 19. Subject: "What the Sales Department Wants From the Accountant," by V. Frank Banta.

Forthcoming Meetings

National Safety Council. Mid-West Safety Conference, Chicago, March 19. A. A. Mowbray, director of publicity, 108 E. Ohio St., Chicago.

American Gear Manufacturers' Association. Twelfth annual meeting, Rochester, N. Y., April 19, 20 and 21, Hotel Seneca. T. W. Owen, secretary, 3608 Euclid Ave., Cleveland, Ohio.

American Welding Society. Annual meeting, week of April 23, New York City. M. M. Kelly, secretary, 33 West 39th Street, New York City.

American Railway Association. Schedule of sectional meetings: Division IV, Engineering, March 6 to 8, Chicago; Division V, Mechanical, June 13 to 20, Atlantic City, N. J.; Division VI, Purchases and Stores, June 13 to 15, Atlantic City, N. J.

National Metal Trades Association. Thirtieth annual meeting, Hotel Astor, New York, April 25 and 26. J. E. Nyham, secretary, Peoples Gas Bldg., Chicago, Ill.

National Foreign Trade Council. Fifteenth anniversary convention, Houston, Texas, April 25, 26 and 27. O. K. Davis, secretary, India House, Hanover Square, New York.

American Foundrymen's Association. Convention and Exhibit, Philadelphia, May 14 to 18. Technical Sessions at Hotel Belleview-Stratford; exhibit at Commercial Museum. R. E. Kennedy, secretary, 140 So. Dearborn St., Chicago.

National Association of Purchasing Agents. Annual meeting and "Informashow," Kansas City, Mo., May 28 to 31. W. L. Chandler, secretary, 11 Park Place, New York.

Association of Iron and Steel Electrical Engineers. Annual meeting, Stevens Hotel, Chicago, June 25 to 29. J. F. Kelly, managing director, Empire Bldg., Pittsburgh, Pa.

American Society for Testing Materials. Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 25 to 29. C. L. Warwick, secretary, 1315 Spruce St., Philadelphia, Pa.

Society of Automotive Engineers. 1928 Summer Meeting, Chateau Frontenac, Quebec, Canada, June 26 to 29. C. E. Heywood, in charge of meetings, 29 West 39th St., New York.

American Railway Tool Foremen's Association. Annual meeting, Hotel Sherman, Chicago, Sept. 12, 13 and 14. G. G. Macina, secretary, 11402 Calumet Ave., Chicago.

American Railway Tool Foreman's Association. Sixteenth annual convention of the Supply Association, Hotel Sherman, Chicago, Sept. 12, 13 and 14. F. A. Armstrong, secretary, the Pratt & Whitney Co., 564 W. Monroe St., Chicago.

American Society for Steel Treating. "National Metals Exposition," Commercial Museum, Philadelphia, Pa., week of Oct. 8. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

The Weekly Price Guide

Rise and Fall of the Market

STEEL prices continue to rise; the most recent change being that of $2 per ton in hot-rolled strips. Non-ferrous metals, fuel, scrap, and pig iron tend downward, with the market particularly dull in the last two. Southern iron stocks are reported as being heavier than usual. Current steel demand consists largely of railway material, structurals and pipe. Mills of the Corporation are operating at 90 per cent of capacity, a gain of 2 per cent in a week. Bars, shapes and plates hold firmly to the price of $1.85 per 100 lb., Pittsburgh, for carloads. Recent mill advances have not, however, affected warehouse quotations on the principal hot-rolled materials.

(All prices as of Feb. 17)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$21.44
Northern Basic	20.89
Southern Ohio No. 2	21.19
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	25.62
BIRMINGHAM	
No. 2 Foundry	16.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76
Virginia No. 2	27.17
Basic	21.26
CHICAGO	
No. 2 Foundry local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	22.80
PITTSBURGH, including freight charge ($1.76) from Valley	
No. 2 Foundry	20.26
Basic	19.26
Bessemer	21.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.50@4.75
Cleveland	5.00
Cincinnati	4.30
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10@2.20	3.50	3.25	3.89
No. 12	2.15@2.25	3.55	3.30	3.94
No. 14	2.20@2.30	3.60	3.35	3.99
No. 16	2.30@2.40	3.70	3.45	4.09
Black				
Nos. 18 to 20	2.70@2.80	3.75	3.55	4.00
No. 22	2.85@2.95	3.90	3.70	4.15
No. 24	2.90@3.00	3.95	3.75	4.20
No. 26	3.00@3.10	4.05	3.85	4.30
No. 28	3.15@3.35	4.20	4.00	4.45
Galvanized				
No. 10	2.95@3.05	4.10	3.90	4.25
Nos. 12 to 14	3.05@3.15	4.20	4.00	4.35
No. 16	3.15@3.25	4.30	4.10	4.45
No. 18	3.30@3.40	4.45	4.25	4.60
No. 20	3.45@3.55	4.60	4.45	4.75
No. 22	3.50@3.60	4.65	4.50	4.80
No. 24	3.65@3.75	4.80	4.60	4.95
No. 26	3.90@4.00	5.05	4.85	5.20
No. 28	4.15@4.25	5.30	5.10	5.45

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	54%	41%
2½ to 6 in. steel lap welded	48%	35%	53½%	40½%	51%	38%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4% less 5%. Cast iron, standard, sizes 36–5% off.

Size, Inches	List Price per Foot	—Diameter in Inches— External	Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

—Thickness— Decimal	B.w.g. and Fractions	Outside Diameter in Inches ½	⅜	¾	⅞	1	1⅛	1¼
		Price per Foot						
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049″	18	.17	.18	.19	.20	.21	.23	.25
.065″	16	.19	.20	.21	.22	.23	.25	.27
.083″	14	.20	.22	.23	.24	.25	.27	.29
.095″	13	.21	.23	.25	.26	.27	.29	.31
.109″	12	.22	.24	.26	.27	.28	.30	.32
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33
.134″	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	....	4.65
Spring steel, heavier	4.00	....	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.49	3.65	4.15
Cold rolled strip steel	6.25	5.70	6.10
Floor plates	5.25	5.30	5.00
Cold drawn, round and hex.†	3.30	3.65	3.60
Cold drawn, flats and squares	3.80	4.15	4.10
Structural shapes	3.34	3.00	3.10
Soft steel bars	3.24	3.00	3.00
Soft steel bar shapes	3.24	3.00	3.00
Soft steel bands	3.99	3.65	3.65
Tank plates	3.34	3.00	3.10
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

Electric welding wire, New York, 3/32, 8.35c.; ⅛, 7.85c.; 3/32 to ⅛ 7.35c. per lb. *Flat, 1/16@⅛-in. thick. †Also shafting and screw stock.

METALS

Current Warehouse Prices in Cents Per Pound for Small Lots.			
Copper, electrolytic, up to carlots, New York			15.37½
Tin, pigs, 5-ton lots, New York			52.75
Lead, pigs, up to carlots, E. St. Louis 6.15		New York	7.00
Zinc, slabs, up to carlots, E. St. Louis 5.57½		New York	6.50

	New York	Cleveland	Chicago
Antimony, slabs, ton spot	13.50	13.87½	14.25
Copper sheets, base	22.75	22.75	22.75
Copper wire, base	19.37½	19.37½	15⅞@15¾*
Copper bars, base	22.25	22.25	22.25
Copper tubing, base	24.50	24.50	24.50
Brass sheets, high, base	18.75	18.75	18.75
Brass tubing, high, base	23.62½	23.62½	23.62½
Brass rods, high, base	16.50	16.50	16.50
Brass wire, high, base	19.25	19.50	19.25

*Mill.

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%, 1 to 15 ton lots	24.30	26@27	24.03
Zinc sheets (casks)	11.00	12.65	10.36
Solder (½ and ½), (case lots)	34.25	35.50	33@37
Babbitt metal, delivered, New York, cents per lb.:			
Genuine, highest grade			71.00
Commercial genuine, intermediate grade			61.00
Anti-friction metal, general service			31.50
No. 4 babbitt (f.o.b.)			12.50
Nickel, f.o.b. refinery, cents per lb.:			
Ingots 35.00	Electrolytic 37.00	Shot 36.00	

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Full finished nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	45.00
Cold drawn rods, Grade "A" (base)	53.00

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	28.00	Hot rolled rods (base)	35.00
Blocks	28.00	Cold drawn rods (base)	43.00
Cold rolled sheets (base)	50.00	Full finished sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible copper	12.25 @12.50	11.50	11.00@11.50
Copper, heavy, and wire	11.50 @12.25	10.75	10.50@11.00
Copper, light, and bottoms	10.25 @10.75	9.50	9.25@ 9.75
Heavy lead	5.00 @ 5.25	5.25	4.50@ 5.00
Tea lead	4.00 @ 4.25	3.75	3.50@ 4.00
Brass, heavy, yellow	7.12½@ 7.37½	7.25	7.00@ 7.50
Brass, heavy, red	9.00 @ 9.50	9.75	9.00@ 9.25
Brass, light	5.50 @ 6.00	5.75	6.00@ 6.50
No. 1 yellow rod turnings	7.25 @ 7.75	7.50	7.00@ 7.50
Zinc	3.25 @ 3.50	3.25	2.50@ 3.00

TIN PLATES—Charcoal—Bright—Per box.

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	14x20	$12.10	$11.95	$11.50
"A" Grade:				
IC,	14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box				
100-lb.,	14x20	6.10	6.10	7.00
Terne Plates—Small lots, 8-lb. Coating—Per box				
IC,	14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.10@0.13½	$0.16	$0.15@0.20
Cotton waste, colored, per lb.	.09@ .13	.12	.12@.17
Wiping cloths, washed white, per lb	.15½@.17½	38.00 per M	.15
Sal soda, per lb	.02	.02	.02¾
Roll sulphur, per lb	.027	.03½	.04
Linseed oil, raw, per 7½-lb. gal., 5 bbl. lots	.76½	.86	.78
Lard cutting oil, 25% lard, in 5 gal. cans, per gal.	.65	.50	.50
Machine oil, medium-bodied (55 gal. steel bbl.) per gal	.27	.35	.26
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin.ft. per inch of width for single ply.			
Medium grade	35%	35%	35%
Heavy grade	30%	30%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.			
First grade	45%	50–10%	50%*
Second grade	50%	60–5%	50–10%†

*Large quantities, 60%. †Large quantities, 60–10%.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0324	$0.0324	$0.0324
Cold drawn shafting	per lb.	.033	.033	.04
Brass rods	per lb	.165	.165	.1562½
Solder (½ and ½)	per lb	.3425	.3675	.42
Cotton waste, white	per lb	.10@.13½	.10@.13½	.13@.17½
Emery disks, cloth, No. 1, 6-in. dia	per 100	3.10	3.10	3.10
Lard cutting oil	per gal	.65	.65	.55
Machine oil	per gal	.27	.27	.33
Belting, leather, medium	off list	35%	35%	40–5%
Machine bolts, up to 1x30 in., full kegs	off list	50%*	50%*	40%

*New list April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
*Flint paper	$5.40	$4.95	$5.13
*Emery paper	10.71	9.15	10.71
*Emery cloth	27.84	27.85	27.84
Emery disks, 6 in. dia., No. 1, per 100:			
Paper	1.29	1.27	1.32
Cloth	3.10	3.05	3.05
Fire clay, per 100 lb. bag	1.00	.75	.75

Coke, prompt furnace, per net ton	Connellsville,	2.65@3.00
Coke, prompt foundry, per net ton	Connellsville,	3.75@4.50
White lead, dry or in oil	100 lb. kegs	New York, 13.75
Red lead, dry	100 lb. kegs	New York, 13.75
Red lead, in oil	100 lb. kegs	New York, 15.25

*4½ reams and under.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

	Full Kegs or Cases
Machine bolts, square heads and nuts:	
Up to ¾ x 6-in.	55%
Larger up to 1 x 30-in.	50%
1¼ and 1½ in. dia.	35%
Carriage bolts:	
Up to ½ x 6-in.	55%
Larger sizes	50%
Coach and lag screws:	
Up to ½ x 6-in.	55%
Larger sizes	50%
Tap bolts, hexagonal heads	40%
Nuts:	
Hot pressed, square and hexagonal, blank or tapped, up to 1-in., incl.	55%
Cold punched, square and hexagonal, blank or tapped, up to 1-in. incl	55%
Semi-finished, hexagonal, tapped, in packages, all sizes	40%
Case hardened, hexagonal, tapped, in packages, all sizes	30%
Washers: Deduct from list, per 100 lb	$3.50*
Rivets, button and cone head:	
Small, including 7/16-in. dia	50–10%
Large (base) per 100 lb. net	$5.00†

Note—For less than case or keg quantities on bolts, screws, hot-pressed and cold-punched nuts, add extra of 10 per cent to list.
*Broken keg lots, $1.50 off list. †Broken keg lots, $6.50 net.

Machine Requirements and Industrial Construction

Equipment Wanted

D. C., Washington—A. L. Flint, General Purchasing Office of Panama Canal, will receive bids until Feb. 27 for a crane, etc.

Mass., Auburndale (Boston P. O.)—Abramson & Bennett, Taylor Bldg.—miscellaneous tools and equipment for proposed repair and service garage at Auburn and Lexington Sts. Estimated cost $50,000.

Mass., Boston—Schoolhouse Dept.—metal working lathes also metal working, milling and woodworking machinery for Continuation School on Common St.

Mass., Framingham—H. J. Porter, 181 Concord St.—miscellaneous tools and equipment for proposed repair and service garage on Union Ave. Estimated cost $40,000.

Mich., Detroit—Detroit Laundry Machinery Co., 5833 Vernor Highway W., (laundry machinery)—one 60 in. vertical boring mill.

Mich., Detroit—R. L. Spitzley Heating Co., 246 West Larned St.—equipment including pipe threading machine for shop.

Mich., Jackson—Sparks-Withington Co.—equipment for proposed 2 story, 60 x 260 ft. radio factory.

Mo., Springfield—L. J. Kent Boiler & Sheet Iron Works, 700 East Brower St.—planer, shaper and milling machine for proposed 1 story, 80 x 120 ft. plant.

O., Cleveland—Carter Machine Co., 983 Front St.—4,000 to 8,000 lb. punch presses, 3 in. stroke or more.

O., Cleveland—Steel Improvement & Forge Co., C. H. Smith, Pres., 5003 Windsor Ave.—drop hammer, drill machine and die sinking machinery for proposed forge, press and die shops. Estimated cost $100,000.

Pa., East Pittsburgh—Westinghouse Electric & Mfg. Co. Walnut and 30th Sts., Philadelphia—one 5 ton overhead electric crane, 25 ft. 6 in. span, 1 motor.

Tex., San Angelo—Packard Auto Co., c/o C. Taylor—machinery and equipment for proposed 2 story, 75 x 190 ft. repair shop. Estimated cost $60,000.

Va., Clarksville—Burton Ginning & Mfg. Co.—one bolt equalizer, one double steel wheel stave jointer, one stave sawing machine capable of sawing staves 30 in. long on 20 in. circle and one large fan for disposing of saw dust and shavings.

Ont., Bridgeburg—Horton Steel Works—power and traveling cranes for proposed 90 x 305 ft. addition to plant. Estimated cost $50,000.

Opportunities for Future Business

Calif., Berkeley—B. G. McDougall, 353 Sacramento St., San Francisco, Archt., is receiving bids for a 1 and 2 story plant on Parker St. here for Bunting Iron Works, 820 Parker St. Berkeley. Noted Dec. 22.

Calif., Glendale—Glendale Union High School Dist., will soon award contract for a 1 and 2 story shop, etc.

Calif., Huntington Park—S. Karpen & Bros., awarded contract for a 4 story, 80 x 200 ft. furniture factory at 925 Irvington Ave. Estimated cost $200,000. Noted Feb. 2.

Calif., Los Angeles—Austin Securities Co., awarded contract for a 1 story, 80 x 150 ft. factory on Merrill Ave. Estimated cost $50,000. Coast Machinery Co., 464 East 3rd St., lessee.

Calif., Oakland—City is having plans prepared for 1 story, 150 x 300 ft. corporation yard buildings including machine and maintenance shops for city equipment at 8th and Fallon Sts. Estimated cost $50,000. L. S. Stone, 354 Hobart St., Archt.

Calif., Redwood City—Sequoia Union High School Dist., voted $250,000 bonds for addition to high school including new mechanical arts building, woodworking and machine shops, etc.

Calif., San Francisco—Pacific Gas & Electric Co., 245 Market St., is having preliminary plans prepared for the construction of a machine shop, garage, etc. at Harrison and 18th Sts. Estimated cost $150,000. Private plans.

Calif., Stockton—Graham Bros., manufacturers of motor trucks, plans addition to factory. Estimated cost $75,000.

Conn., Norwalk—E. H. Hotchkiss Co., 6-12 Hoyt St., manufacturers of clips, awarded contract for a factory. Estimated cost $70,000. Noted Feb. 8.

Conn., East Hartford—Acme Upholster Co., 117 Allyn St., Hartford, plans the construction of a factory. Estimated cost $100,000. Architect not selected.

Conn., West Haven—Western Electric Co., 80 John St., is having preliminary plans prepared for a 2 story factory. Estimated cost $40,000. Private plans.

Ill., Chicago—American Ventilating Co., Room 2049 Builders Bldg., has work under way on a 2 story, 70 x 103 ft. factory for the manufacture of sheet metal goods at 2237 West Lake St. Estimated cost $30,000. Levy & Klein, 2049 Builders Bldg., Archts.

Ill., Chicago—Minerallas Electric Co., 1045 Washington Blvd., awarded contract for a 2 story, 72 x 115 ft. factory for the manufacture of electrical supplies. Estimated cost $30,000.

Ia., Cedar Rapids—W. King, 98 First Ave. We. and T. R. Warriner, 119 Second Ave. E., will build a 1 story, 93 x 120 and 40 x 47 ft. machine shop and garage. Estimated cost $45,000. W. J. Brown, Bever Bldg., Archt. International Harvester Co., T. J. Bendalage, Local Mgr., lessee.

Ia., Griswold—Laco Oil Gas Burner Co., L. A. Cocklin, Pres., will build two 72 x 150 ft. factory buildings.

Ky., Louisville—U. S. Foil Co., 30th and Grand Sts., is having plans prepared for a 3 story 112 x 200 ft. addition to factory. Estimated cost $150,000. O. P. Ward, Lincoln Bldg., Archt.

Maryland—The Industrial Fibre Co., H. Rivitz, Pres., West 98th St. and Walford Ave., Cleveland, O., is having plans prepared for a 1 story, 83 x 330 ft. factory here. J. E. Sirrine Co., 309 South Main St., Greenville, S. C., Archt. and Engr.

Mass., Fitchburg—Independent Lock Co., M. Falk, Pres., 78 Winter St., had plans prepared for a 2 story, 40 x 150 ft. factory. Estimated cost $45,000. Private plans.

Mass., Lynn—Essex Tire & Supply Co., 118 Central Ave., is receiving bids for a 2 story, 60 x 100 ft. tire and repair shop. Estimated cost $40,000. G. A. Cornet, 10 Central Ave., is architect.

Mich., Jackson—Frost Gear & Forge Co., Horton St., awarded contract for a 2 story, 50 x 100 ft. factory at Horton and Tyson Sts. Estimated cost $50,000.

Mich., Marshall—Rich Steel Products Co., C. C. Rich, Battle Creek, awarded contract for a 1 and 2 story, 185 x 295 ft. factory for the manufacture of engine valves here. Estimated cost $90,000.

Miss., Laurel—Mason Foundry Co., awarded contract for addition to foundry and machine shop.

Mo., Jefferson Barracks (St. Louis, P. O.)—U. S. Veterans Bureau, Room 791 Arlington Bldg., Washington, D. C., will receive bids until Mar. 13 for the construction of a new shop at U. S. Veterans Hospital here.

Mo., Kansas City—Sheffield Steel Co., W. L. Allen, Pres., Sheffield, is having plans prepared for general enlargement of all present mill buildings including new wire and nail factory, new bar and rod mill, blooming mill for reduction of ingots and open hearth furnace, etc. here. Estimated total cost $750,000. Private plans.

Mo., North Kansas City—Joslyn Mfg. & Supply Co., Chamber of Commerce Bldg., Chicago, Ill., awarded contract for rebuilding 1 story, 54 x 165 ft. factory, here recently destroyed by fire. Estimated cost $30,000.

N. J., Roebling—J. A. Roebling's Sons Co., W. A. Anderson, Treas., South Broad and Canal Sts, Trenton, plans the construction of a new rod mill here Estimated cost $1,000,000. Architect not selected.

N. Y., Buffalo—General Drop Forge Co., 1728 Elmwood Ave., is receiving bids for a 1 story machine shop and shipping room. Estimated cost $100,000. E. McGeorge, 3030 Euclid Ave., Cleveland, O., Archt. and Engr. Noted Feb. 9.

N. Y., New York—Finrand Realty Corp., H. Finkelstein, Pres., 277 Broadway, had plans prepared for a 101 x 102 ft. garage and gas station at Home St. and Westchester Ave. Estimated cost $60,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., Archts.

N. Y., New York—E. Haas, 55 Clinton Pl., and E. Leavitt, 322 White Plains Ave., had plans prepared for a 2 story, 100 x 100 ft. garage at White Plains Rd. and Allerton Ave. Estimated cost $80,000. F. Wolfgang, 535 East Tremont St., Archt.

N. Y., New York—Kent Automatic Parking Garage, M. A. Kent, Pres., 350 Madison Ave., awarded contract for a 24 story garage at 209 East 43rd St. Estimated cost $500,000. Noted Dec. 22.

N. Y., Mount Vernon—Ward-Leonard Electric Co., South St., awarded contract for a 1 story, 116 x 116 ft. addition to factory. Estimated cost $40,000.

O., Canton—Timken Roller Bearing Co., plans extensions and improvements including a 1 story, 80 x 166 ft. soaking pit building, 1 story, 100 x 340 ft. addition to tube mill, 1 story, 153 x 252 ft. open hearth extension, 1 story, 10 x 285 ft. addition to mill, etc. at 16th St. and Harrison Ave. W. Estimated total cost $364,000.

O., Massillon—Massillon Steel Casting Co., plans the construction of a 1 story factory on Oberlin Rd. Estimated cost $40,000.

O., Salem—Mullins Body Corp., plans a 1 story, 50 x 300 ft. factory for the manufacture auto bodies, motor boats, etc. on Depot St. Estimated cost $40,000.

Pa., Philadelphia—Brown Instrument Co., Roberts and Wayne Sts., will soon award contract for the construction of a factory. Ballinger Co., 12th and Chestnut Sts., Archt.

Pa., Philadelphia—Quaker City Iron Works, Tioga and Richmond Sts., will build a 1 story, 140 x 150 ft. factory at Ontario and Aramingo Sts. Estimated cost $25,000. Private plans.

Pa., Pittsburgh—The Hubbard Co. Butler St., awarded contract for a 150 x 250 ft. assembly plant and warehouse. Estimated cost $150,000.

Pa., Pittsburgh—Smithfield Diamond Land Co., J. I. DeRoy, c/o G. O. Rogers, 432 Smithfield St., awarded contract for a 2 story, 50 x 125 ft. service building on Craig St. Estimated cost $40,000.

Vt., St. Johnsbury—C. H. Goss Co., 17 Central St., is receiving bids for a 1 and 2 story, 85 x 105 ft. repair and service garage on Central St. Estimated cost $40,000. H. K. Wheeler, 144 Portland St., Archt.

Wis., Milwaukee—Argo Investment Co., plans the construction of a 6 story, 100 x 151 ft. garage on 5th St. Estimated cost $300,000. R. C. Kurtz, 287 33rd St., Archt. Osthoff Peterson Co., Engrs.